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TREATMENT OF PNEUMONIA WITH SPECIAL REFERENCE TO THE USE OF SERUM.

C. P. HOWARD, M.D.

Iowa City, Iowa, U.S.A.

THERE is no disease which has been such an alluring field for investigation to the enthusiastic therapeutist as has pneumonia. This is readily explained by the fact that it is a self-limited disease of short duration and that it is apt to run its course quite independently of what the clinician strives to do. Provided we follow a few elementary rules of nursing, the pneumococcus and its host carry on the battle, cooly ignoring the pin pricks and the irritations of the anxious and over-zealous practitioner of medicine.

Up to the past decade all therapeutic measures have been symptomatic, and as these are no doubt still important, we propose to discuss them first. It must be understood that we are speaking of the primary lobar pneumonia, and not those secondary to some other disease, as typhoid fever, influenza or one of the terminal pneumonias of the chronic maladies as cardio-renal insufficiency. As Means has recently well said, the symptomatic treatment of pneumonia has chiefly to do with the supply and demand of pulmonary ventilation. I think Means' attitude is the expression of the teachings of Haldane and his school, who have always insisted that "the physiology of to-day is the medicine of to-morrow." There is an increased demand for ventilation because of the following factors:

(1) An increase in metabolism. (2) The existence of acidosis. (3) The presence of anoxemia. (4) A deficient blood flow. (5) Superventilation of the lung; and (6) Restriction of the vital capacity, due in part to the consolidation of the lung and in part to tympanites.

The *increase in metabolism* can only be checked by combating the pneumococcus itself through the use of specific sera, but no doubt its effects can be restricted by supplying sufficient calories in the diet and by keeping down the fever by an ice bag and cooling sponges.

The *acidosis* present is usually slight but may be of a marked degree. When such is true, as indicated by the usual laboratory tests of the urine and blood, we have followed the practice of Litchfield[2] in using intravenous glucose solution in high concentration (25%). The amount given is 500 cc., which is repeated in 12 to 24 hours, if necessary. Further, soda bicarbonate may be added to this solution as well as given in full doses by mouth and per rectum.

The *anoxemia* or deficiency of oxygen in the arterial blood is an important factor according to Meakins[3]. Haldane, writes Barcroft[4], believes "anoxemia not only stops the machine but wrecks the machinery." Decreased alveolar CO_2 and hyperpnoea are often associated with a condition of oxygen deficiency, according to MacLeod[5]. Increase in H-ion concentration of the arterial blood on account of the appearance of unoxidized acids has been considered as the possible cause for the symptoms of anoxemia. The only possible treatment is to raise the tension of the oxygen in the alveolar air sufficiently to force some into solution in the plasma. There is probably no therapeutic measure that

is less efficiently practised than the administration of oxygen. It would be laughable, were it not so serious, to see the average practitioner thrust a tube into the poor patient's nostrils and turn on the tap of the oxygen tank; or perhaps if he is more ingenious and has access to the ether mask, to try with this apparatus to provide the starving tissues with oxygen. By means of the Haldane method, according to Meakins[6], one can give oxygen at the rate of 2.5 litres of oxygen per minute with absolute certainty. Evidence of the benefit obtained is afforded by the easier and deeper breathing, the slowing of the pulse, the disappearance of cyanosis and the greater ease and comfort experienced by the patient. These effects may outlast the administration and certainly will serve to tide over a crisis. Treatment should be started early before irreparable damage has been done to the nerve centers and tissues and should be maintained until cyanosis has disappeared. The respiratory center is among the first to suffer from anoxemia, and this injury results in shallow and rapid breathing, which does not properly ventilate the lung, so that a vicious respiratory circle is established. While some prefer Haldane's mask, others recommend Meltzer's hollow tongue depressor; but of course the most satisfactory method would be to place the patient in a respiratory cabinet filled with oxygen, which every well equipped hospital of the future will no doubt possess.

The *deficient blood flow* can in part be met by the judicious use of cardiac stimulants as digitalis in one or other of its preparations. Digitalis is clearly indicated when the right heart becomes dilated or even when the first or second sound of the heart becomes dull and toneless. Then, and not till then, should digitalis be exhibited. Whether strychnia will aid directly or indirectly is a much mooted question. Personally, I prefer to use strychnia in such cases in full doses of 1/30 of a grain hypodermically every four hours.

The *super-ventilation of the lung:* The normal pulmonary ventilation depends largely upon the H-ion concentration of the blood, but also partly upon the CO_2, both of which have a stimulating influence upon the respiratory center. It is likely, therefore, that super-ventilation is very closely linked with the control of the reaction of the body fluids and with the etiological factors of acidosis. We may possibly combat this element when we treat the acidosis by the glucose and bicarbonate therapy previously mentioned.

The *restriction of the vital capacity* of the lung from consolidation is not within our control except through serum-therapy, but that due to tympanites is most certainly. The older clinicians among my audience no doubt have dreaded to see tympanites make its appearance during the course of pneumonia, and have resorted to turpentine stupes and turpentine enemata to overcome it. It is in my opinion good practice, and one that should be followed by the present generation.

Specific Treatment

Following the marvelous success of the antitoxic serum-therapy of diphtheria, it was believed by many that a new era had dawned in medicine. While it is true that antitetanic serum and antimeningitic serum have since been developed, we have been gradually compelled to realize that the majority of the bacterial diseases are not so susceptible to antitoxic serum-therapy, largely because bacteria, like the pneumococcus, typhoid bacillus, etc., owe their injurious effect to endotoxins which were not so diffusable and so did not produce antibody formation in the tissues and blood of the host to any measurable degree. The earlier attempts to produce specific antitoxic sera for pneumonia were very disappointing, and though the work of A. Fraenkel, G. and F. Klemperer, Pane, Roemer, Neufeld and Handel must never be underestimated, it was not until quite recently that Rufus Cole and A. R. Dochez arrived more nearly to the goal of our ambitions. The first important contribution of the staff of the hospital of the Rockefeller Institute was the recognition by Dochez and Gillespie[7], that pneumococci were not all alike biologically; in fact that there were at least three fixed groups, each one of which has its specific agglutinin and precipitin; they further recognized that at least 21% of the pneumococci could not be placed in either of these fixed groups, yet by their bile-solubility and morphology, could be classed with no other organism. This fourth group is the "scrap bag," so to speak, into which all pneumococci other than those of types I, II. and III. must be placed until some future time when some as yet unknown specific tests are discovered. It is indeed of interest that Lister[8], of South Africa, has already described one or two more

specific groups. Cole and his co-workers believe that this variability of type accounts in part for the lack of success in the past with various polyvalent sera, such as those of Kyes, Nichols, McClelland and Camac. After much work, Cole[9] succeeded in producing a high titer serum for type I. pneumococcus alone, and advised that its use should be restricted to type I. infections, through the fear that if used in the other groups it would not yield such satisfactory results, and so fall into disfavor. When the use of the specific type I. serum was restricted to type I. cases Cole noted a remarkable effect upon the course of the disease, which was shortened and rendered less severe and the mortality of which fell from the average one of 25% or 30% to 10% in his first series and to 7.5% in a later one[10]. While statistics can always be made to prove the contention of the author, too many competent observers have verified in the main the contentions of Cole and Dochez, and in nearly every large centre in the United States and Canada, typing of the pneumococcus is being carried out and the specific serum used. Further, recently Cecil[11] has reported favorable results with the specific serum of type II., and others, as Spooner, speak favorably of it, though Cole still maintains that further work is necessary before a type II. serum of sufficiently high titer is available.

It is unfortunately a premise for the success of the specific treatment that typing of the pneumococcus be carried out. This means access to a bacteriological laboratory and a trained technician. In some of the larger cities such are available to the general practitioner. State Board laboratories are already offering similar opportunities, and it seems probable that in the near future it will be possible to send by mail sputa in a sterile container and to receive a report of the type by telephone or telegraph within twenty-four hours after the collection of the material. While this may not be ideal, it will certainly mark a great step in advance. The methods of determining the types are many and include Blake's method of mouse-innoculation[12], Avery's special culture medium[13] and Krumwiede's coagulation method[14]. The two latter, though possibly less accurate, are less time-consuming.

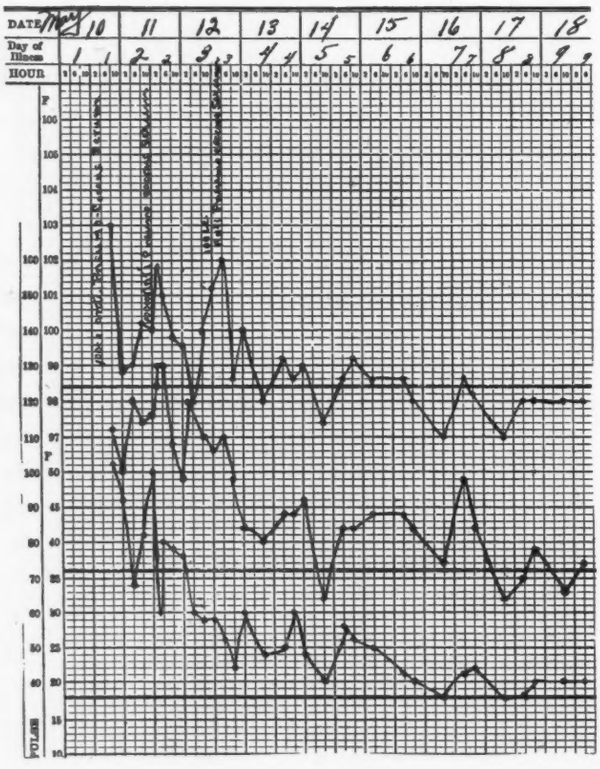
Procedure of administration: To avoid the dangers of anaphylaxis, one should first quiz the patient carefully for a history of hay fever, asthma, susceptibility to horse emanations and for the previous use of serum for such diseases as diphtheria, meningitis and tetanus. Even if one meets with a negative answer to these questions it is safer to give an intracutaneous injection of 0.02 c.c. of horse serum diluted ten times with normal sodium chloride solution and compare its effect with a similar amount of normal salt as a control. If a distinct wheal does not appear at the site of the injection in one hour it is safe to assume that the patient is not hypersensitive to horse serum. This may be done while waiting for the bacteriological report. Nevertheless, it is still well to give a desensitizing dose of 0.5 to 1.0 c.c.'s of horse serum subcutaneously one to two hours before the intravenous therapy. One can now safely give 100 c.c.'s of the high titer Rockefeller serum dilated with 100 to 150 c.c.'s of normal salt solution prepared from freshly distilled water. This can be administered by the gravity or by the syringe method with a three-way cock. The main caution to be exercised is to give it slowly, taking twenty to thirty minutes for the administration and to keep the solution at body temperature. During the early stage of the treatment the patient must be watched for cyanosis, pallor or dyspnoea and if these symptoms of anaphylaxis manifest themselves discontinue the injection and give immediately 10 minims of adrenalin (1 to 1,000) and 1/100 of a grain of atropine sulphate hypodermically. The latter should always be ready mixed and in the syringe for immediate use.

Usually in half to one hour after the intravenous injection of the specific serum, the patient experiences the so-called *"thermal reaction"* manifested by chill, cyanosis and elevation of the temperature; this we must confess is disagreeable to the patient and may cause the physician and relatives some uneasiness, however, shortly, or at least in the course of two hours this reaction is followed by a marked fall in the temperature, profuse sweating and muscular relaxation. This may be permanent, but usually in four to eight hours the fever returns and further treatment is necessary. Cole recommends that 100 c.c.'s of the serum be given every eight hours until the temperature remains normal—usually, however, three doses being sufficient.

In about fifty per cent. of the cases there may occur in seven to ten days the phenomena of the *serum sickness* in a mild form, viz.: urticaria, pruritus and arthralgia. In about ten per cent.

of the cases the reaction may be more severe and the patient suffer from a universal urticaria with intense itching, marked restlessness and a severe arthritis and so require treatment. This should consist of the subcutaneous administration of 10 to 15 minims of adrenalin and the external application of some soothing lotion as the following: Carbolic acid drm. ss; Zinc oxide oz. i; Glycerol drm. ii; Lime water ad oz. viii.

Results: It seems now generally accepted that the type I. serum causes the sterilization of the blood and a limitation of the spread of the process, with consequent shortening of the course of the disease as is well illustrated in Chart I.



The subjective and objective symptoms of the disease are ameliorated. Further, the mortality is definitely reduced, though as we have already warned you, too much emphasis must not be laid upon any statistics except in the mass. In hospital practice, type I. pneumonia has a mortality of 25%, in private practice it is no doubt much less. Further, while Cole's first series in the Rockefeller Hospital had a mortality of only 10% it must be borne in mind that these cases were no doubt selected ones and did not represent the bad risks of a general hospital, to which are usually brought patients on the fourth or fifth day of a severe infection which has resisted the ordinary efforts of home nursing and medical supervision. That ten per cent. is not an unusually low mortality in selected cases is shown by the fact that the Surgeon General of the United States Army[15] reported 6,964,000 cases of primary lobar pneumonia for the year 1917 with a mortality of only ten percent. These cases represented all groups and included many cases not treated by serum-therapy. Be this as it may, Cole later reported a series of 107 cases of type I. pneumococci treated with the specific serum in which the mortality was only 7.5[10]%, a further saving of two to three lives in every hundred. Still more remarkable are Spooner's[16] figures from Camp Devens, Massachusetts; Spooner succeeded in reducing the mortality in a series of fifteen influenzal cases associated with type I. pneumococcus, to seven per cent. by the use of a high titer serum—a striking contrast to the thirty-one cases which did not receive serum-therapy and in which the mortality was 43%. Cole's[17] last report of 195 cases treated at the Rockefeller Hospital with 300 cases from the literature yielded a somewhat higher mortality, viz: 10.5%.

Such observers as Cole, Dochez[18], Spooner, Lord[19] Cecil[20], etc., are convinced of the value of the serum in type I. infections and believe there is no escape from the obligation to use it. We can only say that we are of a similar opinion, though our series is yet too small to be used as an argument in its favor. Our prejudice is based rather upon the reports from literature and the observation of our own small series.

Just one word more—the sooner the serum is given, the more effective it will be, for as Cole has shown in the pneumonia infection, there is an elaboration of soluble inhibitory substances which tend increasingly to diminish the potency of the serum as the disease progresses.

Stengel[21] has recently recommended the further use of *"convalescent serum"* obtained from the patient shortly after the crisis. In eight cases of primary acute lobar pneumonia, he reports but one death, while in twelve influenza pneumonias there were three deaths. He advises the use of only 30 to 70 c.c.'s of the "convalescent serum" which has been kept on the ice in a sterile container and used as soon as possible, preferably not later than ten days to two weeks after collection. Stengel does not recommend it as a substitute for type I. serum, but rather for cases which belong to the other groups.

Vaccine therapy: Pneumococcus vaccine is a

suspension of killed pneumococci in broth or salt solution. It may be monovalent, as is the rule in the autogenous preparation, or polyvalent as in the stock or commercial form. It is usually given subcutaneously in doses varying from 10 to 1,000 million pneumococci or even more. Time will not permit us to discuss in detail the reactions that follow its use; suffice it to say that they are very similar to those of anti-typhoid vaccination. As a prophylactic measure, it may have some distinct value, according to Cecil and Austin[22]. Therapeutically, Rosenow[23] has recommended the use of partially autolyzed pneumococci in daily doses of 1.0 c.c. until the temperature reaches normal; in 200 cases so treated, there were but 14 deaths or a mortality of only 7%. This of course compares favorably with the results of serum-therapy, but it has not yet received a sufficient trial. Rosenow frankly admits that the serum treatment of type I. infections should take precedence, but he recommends the use of his antigen when serum is not available and in the other types of infection.

Pneumococci vaccine is contra-indicated, according to Cecil[24], in acute infections, in chronic pulmonary tuberculosis and nephritis. It should not be administered in large doses to patients with chronic cardiac disease, or to invalids or to pregnant women after the fifth month.

Conclusions: In spite of a more or less intensive study of the problems of pneumonia during the past ten years, particularly by the American Research student, we must confess that no startling advances have been made. However, even the most conservative are forced to admit that real progress has been achieved, and particularly in the recognition of the various types of pneumococci and the preparation of a serum to combat one strain, at least.

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ETIOLOGY OF RENAL INFECTIONS*

With Special Reference to Urinary Stasis in Infections of the Renal Pelvis.
From Department of Urology, Royal Victoria Hospital.

DAVID W. MACKENZIE, M.D.

Montreal

BACTERIA are the exciting cause of bacterial infections, but not the sole cause. Many are saprophytic and only under certain conditions become parasitic and pathogenic. Many bacteria, which can become pathogenic are almost universally present in the throat, bowel and skin of almost all individuals. This is especially true of the microorganisms found in the kidney where by far our most common, excluding the tubercle bacillus, are the colon bacillus and staphylococcus. Indeed these common bacteria are universal symbiotics of the human species and probably every one of us carries them about on our mucous and skin surfaces. Almost universally and daily the bacteria are invading the blood stream in varying doses; they are being distributed throughout the tissues and are got rid of by the excretory channels, occasionally becoming pathogenic and setting up a local or general inflammation.

The problem is not how we can sterilize the world of pathogenic bacteria, but why these bacteria become pathogenic in certain individuals and not in others. To remove all pathogenic bacteria from the world would be a hopeless problem. We never shall be able to sterilize the alimentary canal nor is it desirable that we should do so.

In the causation of disease predisposing factors of great variety must exist to enable the exciting cause, the micro-organisms, to act; the bacteria, the exciting cause, are universally present. The predisposing causes are variable factors and when present in a certain individual in one or more variants enable the bacteria to set up inflammation and fever or in other words "disease."

We cannot sterilize the world. Human life would come to an end if we did. In many ways bacteria are necessary to human life. We must live with bacteria and use bacteria, as for instance, in digestion. I cannot therefore agree with some of our professional friends who would, if they could, remove the whole intestine, preferring to see us die of starvation rather than see us suffer from what they call "Intestinal Toxaemia." Let us therefore cease our hopeless endeavours to kill all bacteria and let us devote our efforts to preventing pathogenic infections by methods of raising immunity, artificial and natural; and to educating the man in the street to live by simple hygienic rules based on the avoidance and removal of predisposing causes. This will meet Sir James MacKenzie's criticism, that we do not investigate the early symptoms of disease in the stage before they have caused permanent anatomical changes in the organs.

If preventive medicine is to accomplish the best results in this line, it is not by ridding the world of all bacteria but by teaching us how to live with our parasites and by endeavouring only to get rid of those which it is clear we would be better without, such as the tubercle bacillus, the gonococcus, the spirochaeta pallida, etc.

In the kidney the mere physical presence of one or more bacteria does not constitute a nephritis medically or surgically. Here we come to the academic differentiation between toxic and infectious nephritis. The bacteria are not the cause of the toxic nephritis but the poison they produce is the cause and this poison can do the damage with equal ease whether the bacteria are in the tonsil or the kidney provided the poison reaches the kidney.

The bacteria which most commonly are, or may be, the exciting cause of renal infection may be roughly grouped as follows: First, the coccus group, chiefly staphylococcus; second, the acid-fast bacillus which means practically only the tubercle bacillus in man; third, the colon bacillus group in order of frequency; communis, communior, acidformans, fecalis, etc.; and fourth,

*Read before The Canadian Medical Association, Halifax, July, 1921.

the rare forms of bacteria found in the urine of unknown pathogenicity. Of these types the colon bacillus is by far the commonest infecting organism of the urinary tract. From eighty to ninety percent. of persistent urinary infections excluding tuberculosis, are due to the colon bacillus. Paths by which infection may reach the kidney, namely by way of lumen of urethra and ureter, the blood stream and lymphatics, have been discussed and again discussed. We believe the blood route is by far the most common but we will not stop here to discuss our reasons.

The excretory power of the kidney for bacteria has been recognized for years but not sufficiently appreciated by clinicians. Albarran demonstrated that in blood infections the organisms were eliminated by way of the kidneys in some cases without damage that could be demonstrated.

Positive guinea pig tests are frequently obtained from the urine of tubercular patients where at autopsy no lesions of the kidneys are found. The same is true of typhoid or paratyphoid cases. It must be remembered that bacteria either from the action of the blood or the kidney tissue through which they pass, may be dead when they reach the urinary stream and no urinary infection results. Unilateral renal lesions also result from blood infection. Crabtree produced a unilateral renal lesion in a rabbit by injecting colon bacilli into the ear vein.

The important factors concerned in renal infections that determine the character of the lesion produced and the extent of damage done, are the type of organism: staphylococcus, tubercle, etc., the lack of proper drainage or retention, and after the lesion is started the acquired immunity of the individual.

The tubercle bacilli cause lesions in all parts of the kidney. A study of a series of kidneys removed at operation for tuberculosis indicates in a general way the following paths of infection.

I. *Cortex:* The bacilli entering the kidney by the blood stream gain a foothold in the loops of the glomerulus or in the capillary circulation supplying the tubules. Thus small primary tubercles are formed which spread, fuse and generally caseate, extending to the medulla.

Any injury of the endothelial cells, either traumatic or toxic, combined with the mechanical conditions of the circulation favors foothold for virulent bacilli.

II. *Medulla:* The earliest lesions seen in this zone appear frequently at or near the apices of the pyramids (excretory type). Tubercle bacilli which are discharged into the tubules are at this point exposed to stagnation, and possibly the action of crystalline substances, etc., in concentrated form may easily damage the epithelium. In this region we have frequently demonstrated stasis in normal kidneys. Blood and excretory infection may combine.

III. *Pelvis:* Here the lesions apparently begin in the sub-mucosa, the bacilli being brought by the blood or lymph route and gaining access due to local conditions of lowered resistance as in the other types. Pelvic infections may, however, also become secondary to entrance of cheesy masses with bacilli from cortex and medulla.

It must be considered that these statements are very general and made only from observations on operable cases (i.e. on cases in which a diagnosis of unilateral involvement only was made and in which a good prognosis seemed justified).

The initial lesions are the typical tubercle formations. The subsequent history depends on the virulence of the bacilli and the local resistance. As a rule in the cortex multiple small foci form which spread and coalesce.

In the medulla the pelvis usually becomes early involved and the kidney may be reinfected giving the picture of an ascending infection. This is also the picture when the pelvis is the starting point.

Finally, all parts of the kidney, pelvis, medulla and cortex become involved and it must be understood that a great percentage of the kidneys removed show this advanced stage in which it is no longer possible to venture even a guess at the location of the point of entrance of the bacilli.

The coccus type of infection results in glomerulus and cortical lesions which, from the habit of the organism and its high pathogenicity, result in suppuration and production of abscesses and extensive perirenal fat invasion with abscess formation. Cocci appear in the urine late and rarely cause pyuria,—but staphylococci can be obtained from the culture of the urine in many of these cases. The cocci form lesions in the cortex and spread to the perirenal tissues but very rarely invade with their lesions the tubules or pelvis.

The infection starts as a boil or a carbuncle on the skin, infection of tonsils or sinuses; of

prostate or seminal vesicles, etc. Usually a history of some such focus of infection a week to several weeks previously is obtained.

With the colon group the picture is entirely different. Of comparatively low pathogenicity, the organisms may pass the kidney leaving little or no trace of their course to be seen in microscopical sections, save cloudy swelling of the tubules in their convoluted portions. Unlike the coccus family that settle and grow on entering the cortex, the colon group quickly reach the urinary stream. There is a marked attendant functional derangement of the kidney evidenced by a low phenolsulphonephthalein output which is quite temporary and often quickly followed by almost complete recovery of functional activity. The condition is a low grade pyelonephritis of a functional nature rather than a definite pathological entity. In fact the pathologist often passes the kidney which has shown marked decrease in function as a normal kidney.

Should drainage be perfect the condition subsides immediately but if drainage is interfered with, as in kink of ureter in a sagging kidney, the stagnant urine affords the organisms an opportunity to multiply and grow and at the same time renders the kidney tissues less resistant from distention of renal pelvis.

The subject of colon bacillus pyelitis and pyelonephritis in its acute form, has been investigated with thoroughness in many of its aspects. Cultural peculiarities of the organisms concerned and antibody production, which might be of value in therapy, have received exhaustive attention. Treatment of the disease based on special bacterial peculiarities has been at best discouraging; nor has drug treatment been sufficiently definite to exclude any one of many recognized therapeutic measures as the several "schools" existent today bear witness.

Bacteriologically, all are agreed that eighty to ninety percent of persistent urinary infections (excluding tuberculosis) are due to colon bacillus. The organism may be divided into "strains." These, however, bear close relationship and differ somewhat but not greatly in motility and minor cultural characteristics. These all are hardy organisms with almost phenomenal ability to live and flourish in unfavourable surroundings. In fact they need no elaborate food supply but can live off the country and almost any country will do. In fact the study of bactericidal solutions is made in most instances with the colon bacillus at the end of the scale which represnts the hardy organisms. The urine is not a favorable culture media. The colon bacillus persists here in spite of hardships and because of the adaptability of the organism.

Pathologically, also, there is agreement that pyelitis is the characteristic lesion. The pelvis mucosa and to some extent submucosa is involved in a chronic inflammatory process.

In pyelonephritis, its common acute form, invasion of the tubules takes place in addition. Seldom is this infection sufficiently severe to require nephrectomy. With the establishment of drainage the kidney goes on to almost complete recovery. Renal restoration after colon bacillus pyelonephritis is almost complete. We believe that the most important factor in the prolongation of colon bacillus infection of the renal pelvis is faulty drainage, retention or in other words urinary stasis. Clinically we must recognize that colon bacillus infections in the presence of low urinary stasis such as we find with a ptosed kidney, kinked ureter, strictured ureter, calculus and prostatic obstruction cannot be treated with any hope of success until the obstruction is relieved.

Colon pyelitis is generally a progressive disease in which pyelonephritis is the acute form, pyelitis and pyelonephritis, its chronic, and pyonephrosis, a destroyed surgical kidney the end result.

The study of colon bacillus pyelitis and its acute form pyelonephritis, is hampered by the chronicity of the disease. Rarely is it possible for the physician who sees pyelitis at its acute onset to follow the case until the end of its or the patient's life. It often happens that the physician who sees acute pyelitis loses his patient because he fails to produce a speedy cure. If the condition becomes chronic the patient may pass from one doctor to another or if the symptoms are not too severe neglect treatment entirely until years later he reaches the urologist who makes a diagnosis of a destroyed surgical kidney and does a nephrectomy. Another obstruction to progress is the unwillingness of patients to undergo extensive cystocopic study or treatment for a disease which is not often fatal, not disqualifying except during exacerbations and in which the results of treatment are often not quickly apparent. Even though the patient is warned that neglect may mean the loss of a kidney in the end, that end is remote. We

believe that now with a much improved cystoscopic technique and more advanced laboratory and x-ray facilities it is possible to obtain a proper conception of the many predisposing factors in the course of colon bacillus infections of the kidney, that deductions made from collected observations in many cases over a space of time all preferable to a study of a very small group of cases from inception of the infection to the cure or death of the patient. In the history of many of these people ten to fifty years elapses from the onset of the pyelitis until the condition is cured, pyonephrosis develops or the patient dies.

Examination of bladder urine, ureteral catheter specimens with cultures, determination of kidney efficiency, blood retention and pyelograms can be of infinite help in settling this problem; and comparison of findings over periods of time will do much to determine results in the treatment of these infections.

There exists among medical practitioners a wide spread belief that acute pyelonephritis is a medical condition requiring urinary antisepsis and symptomatic treatment such as would be given any acute infection; that becoming chronic it is either cured in a few instances by medicine or the hour glass, and that, for the tendency to persist, nothing can be done. We believe that all these conceptions will eventually be proven to be erroneous and that the first principle of treatment is the removal of the urinary stasis, improvement in drainage and finally combating the infection.

Of the common mechanical predisposing causes in colon bacillus infections of the kidney, we find some outside the ureter, as peritoneal adhesions, tumours of the pelvic organs or bowel, including pregnancy, some in the ureteral wall, as acute and chronic ureteritis, stricture of the ureter, kink, and some within the lumen, as blood clots stone and tumours. From the clinical classification we get: Pyelitis of pregnancy, pyelitis of children, especially little girls, pyelitis of abnormally placed kidney, etc.

A close relation between infectious diarrhoea and colon pyelonephritis in infants is well recognized. Intestinal bacteria may be taken up by the lymphatics or blood vessels from ulceration in the mucosa and in the end reach the blood stream to be excreted by the kidneys producing a pyelonephritis. There is no marked difference as to sex in summer diarrhoea, yet there is a marked preponderance of female cases of pyelonephritis. This is probably due to two reasons; a colon vaginitis serves as a portal of entrance and a more movable kidney from the anatomical type of kidney pocket in the female, causing partial retention and affording the organism a medium for growth. This is also true in the case of what we choose to call the bride's pyelitis. The port of entrance to the blood stream for the colon bacillus is the abraded vaginal mucosa and the lack of drainage of the kidney of the patient accounts for the growth of the organism in the kidney. These cases are not at all as some suppose gonorrhoeal infections. The newly married woman who suddenly gets up an intermittent or permanent fever curve for 102-104° with pyuria and costo-lumbar tenderness is generally not suffering from a gonorrhoeal infection but from a colon pyelonephritis.

Another very similar type is what we choose to call the pyelonephritis of old ladies, generally the poorly nourished type. The portal of entrance here is the atrophic vagina and the predisposing cause is lack of drainage from a sagging kidney.

Kidney displacement whether temporary or permanent seems to us to play a very important part in urinary retention and stasis and therefore in the etiology of infections of the renal pelvis.

If those conditions are to be diagnosed and treated early, the profession as a whole must devote more earnestness to the microscopical examination of the urine. Everywhere we hear of the presence of albumin, the boiling of urine, the nitric acid test, all perfectly good in their place, but how seldom we find a report of pus or white blood cells in the urine; indeed, any microscopical report on a urinary examination.

Slight frequency of urination or bladder irritation demands a thorough examination of the urine and more particularly the microscopical findings.

Infection of the urinary tract generally makes itself known by the vesical irritation it causes. Vesical irritation then should mean first of all an examination of the urine and a general physical examination of the patient. Long continued bladder irrigations without examination or diagnosis are always to be condemned.

The following is a brief summary of the findings in the series reported.

PYELITIS

Number of cases 200

Sex: Male 45%
Female 55%

Average age ..... 36 years.
Oldest ..... 74 years.
Youngest ... 4 years.

Chief Complaints (On admission):

Symptoms referable to Kidney: Pain, aches, etc. ... 52%
Symptoms referable to Bladder: (Frequency, burning, pain and dysuria) 27%
Symptoms noted in Urine: Haematuria 10%
Pyuria 3%
Urethral Symptoms: Discharge and burning ... 2%
Special Symptoms: Chills 4%
Vomiting 1%
Pain in Epigastrium 1%

History: Pain 85%
Frequency 83%
Haematuria 25%
Pyuria 60%
Dysuria 73%
Chills 26%
Sweats 23%

Duration from onset to admission 28 months.
Longest 50 years.
Shortest 2 days.

Urine: Clear 4%, Bloody 2%, Cloudy 94%, Acid 93%, Alkaline 7%, Albumin 94%, Sugar 0%, Average Sp. Gr. 1014, Pus 87%. W.B.C. 12%, R.B.C. 17%.

Phenolsulphonephthalein Test. Average:
First hour 36.3%
Second hour 17.4%
} Total 53.7%
Highest total ..... 93 %
Lowest total ..... 25 %

Types: Anatomical: Bilateral 70%
Unilateral ... 30% { Right ..... 16%, Left 14%

Special Types:
Pregnancy 10%
Children 3%
Brides 3%
Old Age 3%

Etiology: (1) *Bacteria*, Colon family 94.5%
Staphylococci 5.5%
B.Coli-communis 68%
B.Coli-communior 12%
B.Fecalis Alk 6%
B.Acidformans 8%
B.Variant 5%
B.Typhosus 1%

(2) *Accessory Causes:*

(A) Urethral: Retention. (1) Small meatus; Adults .. 37%
Children. 5%
(2) Small urethra. Congenital 3%
Scarred from labor .. 3%
(3) Strictures. Males 6%
Females ... 1%
(4) Prostatism 1%

(B) Vesical: Cystocele 3%

(C) Ureteral: *Outside Pressure:* Pregnancy 10%
Growths as Ca. of Caecum 5%
Calcified Glands 2%
Adhesions, pelvic operations 2%

Inside Causes: Small ureter 6%
Stricture 4%
Calculi, Unilateral 15%
Bilateral 6%

Inside Ureter: Diverticulum lower end ureter 5%

Congenital Causes: Double ureter 1.5%
Irregular kinked ureter 8%
Malposition, Nephroptosis 42%
Nephropexy, etc 2%

TOXIC: Typhoid.

PERINEPHRITIC ABSCESSES.

Number of cases 21

Sex: Male 18
Female 3

Age: Oldest ..... 66 years.
Youngest ..... 20 years.

Type: Bilateral 2
Unilateral ..... 19 { Right ..... 11, Left 8

Organism: Staphlococcus Aureus obtained in all excepting two cases.
Catheter specimen showed same organism on culture in 16 cases.
Urine negative to pus in all excepting three cases.

Etiology: All but three cases had history of previous infection. Boils, Abscess of face, Prostatic abscess, Pyorrhoea, Otitis Media, Infected fingers and toes, etc.

(1) One case abscess tended to burrow towards the front.

(2) Two cases subsided, no operation.

(3) The association of a plastic or serous pleurisy.

Renal Tuberculosis ..... 100 cases.

Sex: Male 60%
Female 40%

Average Age ..... 33 years
Youngest ..... 11 years
Oldest ..... 64 years

Duration ..... 39.5 months
Longest ..... 30 years
Shortest ..... 1 month

Type: Bilateral Tuberculosis 32%
Unilateral Tuberculosis 68%
Right 31%
Left 69%
Tuberculosis with calculus 4%

Treatment of unilateral: Nephrectomy 75%
General and Bladder Treatment.
Average days in hospital P.O. 20 days. No deaths.

SPINAL DEFORMITY AS A CAUSE OF CARDIAC HYPERTROPHY AND DILATATION*

F. G. FINLEY, M.D.

Professor of Medicine and Clinical Medicine, McGill University, Montreal

IN severe cases of scoliosis and kyphosis the capacity of the thorax is greatly diminished. English medical literature is remarkable in the almost complete absence of any reference to the resulting injurious influence on the thoracic viscera and I therefore venture to bring before you four cases of extreme deformity of the thorax resulting in hypertrophy and dilatation of the heart with cardiac insufficiency. Two of these came to autopsy and showed kinking and narrowing of the great vessels, one of the aorta and the other of the pulmonary artery. This feature is so obvious that it is curious that it has escaped notice by so many writers on the subject.

Case 1. Male, 50, admitted to the Montreal General Hospital November 29th, 1920, with shortness of breath and cyanosis. He has suffered from marked deformity of the spine from early life as the result of a fall at three years of age. He has always enjoyed good health, earning his livelihood as a beggar up to three months ago, when swelling of the ankles set in. This gradually increased involving the thighs and abdomen and was accompanied by dyspnoea. He became unable to lie down or even to sit and was obliged to sleep leaning over a bed.

Present Condition. The patient's head is sunk between the shoulders. There is a marked kyphosis, the dorsal vertebrae forming a large rounded projection, convex from above down and from side to side, measuring 20 c.m. vertically and 25 cm. transversely. Above and laterally this merges gradually with the trunk, but below at the level of the iliac crests it joins the trunk abruptly. Anteriorly there is a corresponding projection on the front of the chest. The depth of the thorax is much increased being 34 cm. from before back with a compensatory lateral compression.

The face is much cyanosed, a feature which is much less marked in the hands. There is marked oedema of the legs as high as the hips and involving the genitalia, abdominal wall and also slight oedema of the arms. He prefers the standing posture leaning over a bed, the cyanosis increasing on sitting. The veins of the neck are prominent and much enlarged. The pulse 96, of good volume and regular. The heart is enlarged, the apex being 10 cm. to the right of the mid line and dullness 5 cm. to the right and 10 to the left of mid-sternum. The sounds are clear with a gallop rhythm at the apex. A few moist rales are heard at the bases and there is free fluid in the abdominal cavity. The urine 1030, free from albumen and sugar. The cyanosis and dyspnoea increased in severity and the patient died ten days after admission.

Autopsy. The body was frozen and cut in traverse sections.

Six vertebrae were cut in horizontal section, forming a projection which extended almost half way toward the front of the chest, which was flattened laterally. Both right and left ventricles showed very considerable grades of hypertrophy and dilation. The transverse aorta (Fig. 1) ran back to the left of the spine where

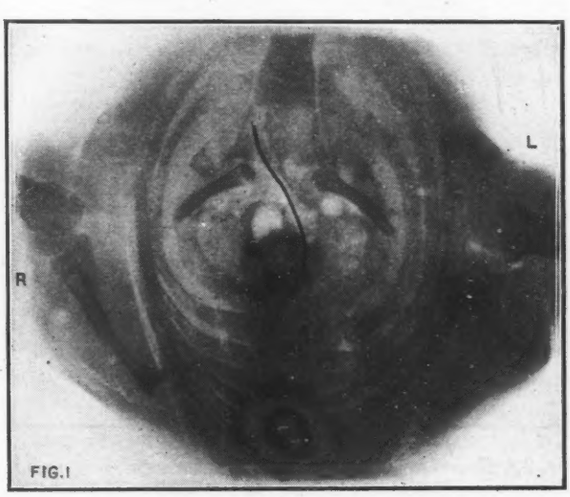

Fig. 1. X-ray photo. of upper portion of thorax looked at from below. A wire shows the course of the transverse aorta and upper part of the descending aorta, the latter passing from left to right along the upper part of the kyphotic curve.

*Read before The Canadian Medical Association, Halifax, July, 1921.

it turned sharply on itself and passing to the right side of the spine followed the upper part of the kyphotic curve. A second abrupt curve was present at the tip of the kyphosis where the vessel turned forward following the lower portion of the vertebral curve and thence backward over the convexity at the lower end of the deformity. At the first two curves a marked kink with constriction of the vessel was present. The lungs and glands showed no sign of tubercle.

The high grade of constriction in the aorta resulting from its sharp curves as it followed the vertebrae sufficiently explains the hypertrophy and dilation of the left ventricle. The right ventricular changes may be partly explained by chronic pulmonary obstruction, partly by compensatory changes from dilation of the left ventricle.

Case 2. High grade of kyphosis. Pulmonary collapse and compression of the pulmonary artery by extreme curving of the aorta. Hypertrophy and dilation of the right heart.

Male, 27, admitted to hospital October 4, 1909, with great dyspnoea and cyanosis. He has had curvature of the spine since childhood, This developed after whooping cough and he has always been short of breath and subject to occasional palpitation.

Two weeks ago he had an alveolar abscess which broke into the mouth a week ago. His present illness began a week ago with pains in the abdomen and sides, shortness of breath, blueness of the lips, face and fingers and swelling of the feet, also a preference for lying on the side.

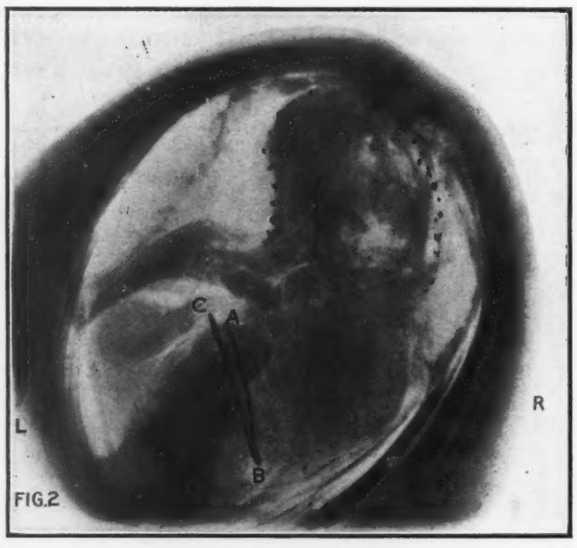

Fig. 2. Shows a wire passed through the ascending arch in front, the dotted line indicating the outline of the heart. Behind the vertebrae cut in transverse section, with the descending aorta passing from left to right, then from right to left and again turning to pass through the diaphragm. The first portion A–B runs along the upper and the second B–C along the lower part of the kyphotic curve.

Present Condition. He lies on the right side. The face and hands show a high degree of cyanosis, being of a deep blue colour. The chest shows great deformity, being convex from above down and from side to side. Behind there is a similar convexity from above down along which the vertebrae cannot be felt. The temperature is 100, pulse 132 small and compressible. The apex is in the fifth space, dullness from mid sternum to 7.5 cm. to the left, sounds are clear. The breathing is laboured and rapid and there are crepitations at both bases. The liver is felt below the costal border and there is slight oedema of the feet. Death occurred two days after admission.

Autopsy, Dr. McLachlan. A poorly nourished and deformed man. There is marked kyphosis of the upper dorsal vertebrae and corresponding lordosis of the lumbar region and a marked pigeon breast. A small quantity of fluid in the serous sacs. The heart weighs 400 gms. The right side is very large and distended with blood and the veins on the surface are also distended. The wall of the right ventricle is hypertrophied and markedly dilated. The left side shows no hypertrophy or dilation.

The aorta follows the course of the kyphosis. There is a sharp angle between the transverse and descending aorta. The transverse running almost directly back along the upper dorsal vertebrae and the descending coming off the tip of the kyphosis and passing forward on the lower dorsal vertebrae. The right pulmonary artery bending beneath the transverse arch is very much compressed. The lower lobe of the right lung is absolutely collapsed and the upper lobe very slightly crepitant. On section the lower lobe cuts with great difficulty and not the slightest degree of crepitus can be elicited. It sinks in water. The left lower lobe is partially collapsed and there is a good deal of congestion present. There is no sign of tuberculosis.

In this case the left side of the heart was unaffected and the sharp turn in the aorta therefore did not offer sufficient obstruction to produce hypertrophy of the left ventricle. The hypertrophy and dilatation of the right side corresponded to the usual type in thoracic deformity and was in all probability due to obstruc-

tion in the pulmonary circulation. Compression of the right branch of the pulmonary artery is a condition which I have not found recorded in any published case and it may well have acted as an accessory cause in the production of dilatation of the right heart.

Case 3. High grade scoliosis. Cardiac insufficiency. Cardiographic tracing shows right preponderance.

Mrs. S., 50, admitted under Dr. Gordon with headache, dyspnoea and cyanosis on May 20th, and died June 1st, 1921.

When a year old she had a fall, injuring the back, and did not walk for five years. She has always been a little short of breath but up to four years ago she has always been able to do hard manual work. The dyspnoea then became more noticeable and for the past two years it has been distressing on exertion. After overexertion three weeks ago severe dyspnoea, headache and weakness set in.

Present Condition. She presents an extreme grade of cyanosis in the face and upper thorax, the hands and feet being less cyanosed. There is a high grade of scoliosis, causing a huge convexity over the left scapular and infra-scapular regions, with much increase of the chest from before back.

The relative heart dullness is increased being 4 cm. to the right and 12 cm. to the left of the mid line. A soft systolic murmur is heard at base and apex and the pulmonary 2nd sound is greatly accentuated. Pulse 120, blood pressure 150, diastolic 94. There are numerous fine and medium sized sharp rales at both bases. The liver extends an inch below the costal border.

She continued cyanosed with orthopnoea, and slight oedema set in. The urine showed albumen, but the kidney function estimated by the blood urea and creatinin was normal.

An electro-cardiogram showed marked right preponderance. An X-ray shows a scoliosis convex to the left, the rib spaces being increased on this side and diminished on the right. The heart shadow is indefinite. The vertebrae are compressed in front and on the right side in the area of scoliosis.

In this case the scoliotic curve was on the left side which is exceptional. It corresponds to the usual type of right sided hypertrophy as shown by the increased dullness to the right and the cardiogram. There was no autopsy.

Case 4. Male, 50, admitted March 23rd, 1921, with weakness of the left arm and leg from syphilitic hemiplegia.

He had a fall at a year old and has been deformed since. Apart from frequent attacks of bronchitis he has had good health up to the time of the syphilitic nervous affections.

Present Condition. There is a marked kyphosis of the lower dorsal and lumbar spine. The heart is enlarged, the apex being in the sixth space outside the nipple line. Transverse dullness 3.5 cm. to the right and 11 cm. to the left. The aortic 2nd sound is accentuated, the blood pressure 220, diastolic 122. No albumen and the kidney functions are normal.

Electrocardiogram show a marked left preponderance. Wasserman strongly positive.

Owing to the presence of a syphilitic infection and of a high blood pressure this case is not so conclusive as the others. It was regarded as one of cardiac hypertrophy, probably due to thoracic deformity, with secondary vascular disease.

Like the first case of kyphosis the left ventricle was involved, the cardiogram showing the predominance of this side.

The occurrence of four cases of thoracic deformity—three occurring within a year—associated with cardiac hypertrophy and dilatation indicates that the combination cannot be very uncommon. According to Barie, Delpech in 1828, was the first to record the association of deformity with cardiac symptoms.

All writers on the subject agree that the right heart is much more frequently affected than the left. Bachmann (quoted by Brugsch) in 268 sections of high grade scoliosis or kyphosis found that 66 per cent. showed hypertrophy and dilatation of the heart. Of these 56.4 affected the right heart, 17.5 the left and 25.9 per cent. both sides. In eight cases collected by de Vésian right sided hypertrophy and dilatation was present in all, in three only was there slight hypertrophy of the left ventricle. The cause of the greater incidence of changes in the right heart must be sought in obstruction in the pulmonary circuit and it is therefore necessary to refer briefly to changes in the lungs induced by the deformed thorax.

In both scoliosis and kyphosis the capacity of the chest is diminished. In kyphosis the thoracic cavity is less contracted than in scoliosis, as the convexity of the back, usually accompanied by a corresponding convexity of the sternumonly, lessens the capacity of the thorax in a vertical direction, together with some dimin-

ution transversely to compensate for the increased antero-posterior diameter. In scoliosis on the other hand, the lateral curve of the spine, usually to the right, together with the rotation to the same side which is usually present, greatly diminishes the capacity of the right side of the thorax, whilst the left side is contracted by the torsion and deformity of the ribs resulting from rotation of the ribs. Defective capacity of the thorax leads to compression of the pliable lungs, diminishing their aerating surface proportionately to the smaller space they occupy. Stasis and oedema, foci of pulmonary apoplexy and even fibrosis are added to the airless portions of lung, whilst emphysematous changes are almost invariably present in the air containing areas. The rigid thorax, with its defective expansion, still further embarrasses the right heart which loses the normal aid rendered by the respiratory movements, whilst the increased resistance in the pulmonary circuit results in hypertrophy and dilatation of the right heart, sometimes leading to tricuspid regurgitation.

The capacity of the lungs, judged from the inspired air at a full breath, has been found by Wintrich to be lessened by from 20 to 60 per cent. These individuals suffer as de Vésian points out from a normal dyspnoea and from great aggravation of symptoms in bronchitis or other thoracic diseases, a fatal termination being sometimes seen even in a simple bronchial catarrh.

Whilst obstruction in the lesser circulation satisfactorily explains the changes found in the right heart it is obvious that similar changes in the left heart cannot be thus accounted for. De Vésian suggests that congestion in the venous circuit eventually throws an extra strain on the left heart but this can hardly account for any considerable degree of hypertrophy, the right heart giving out before such changes are induced on the left side. That sharp curves may occur in the course of the aorta as it follows the abnormal lines of the spine has long been recognized in both kyphosis and scoliosis, in many cases causing no increased resistance to the greater circulation judging by the lack of compensatory changes in the left heart. Corvisart endeavoured to explain the changes in the heart from obstruction offered by these curves and constrictions in the aorta but unfortunately the changes in his cases were confined to the right heart and his interpretation was obviously erroneous. In a case of Lafont's the aorta was narrowed throughout its whole course in a scoliotic without producing hypertrophy of the left ventricle. It would therefore appear that considerable grades of deformity are necessary before inducing changes in the left heart.

Excluding other causes of hypertrophy, particularly nephritis and arteriosclerosis, there remain a large number of cases of left sided hypertrophy for which no satisfactory explanation has been hitherto given. Judging from the conditions found in my first case it seems probable that in some if not in all such instances the narrowing caused by abrupt curves in the aorta offers an increased resistance to the left heart and is the most obvious and satisfactory explanation of hypertrophy and dilatation of the left ventricle.

In minor degrees of scoliosis Brugsch has brought forward evidence to show that cardiac changes may be present. In a series of cases in children palpitation and rapid action of the heart on exertion were frequent manifestations. By means of Röntgen pictures he found that the heart assumes the mitral configuration, a form also present in aplastic conditions due to lack of exercise. Much benefit was obtained both in spine and heart from the creeping exercises of Klapp. The possible development of cardiac disease is a strong argument for the early and efficient treatment of cases of spinal deformity.

The most striking feature in the advanced cardiac cases is cyanosis, which affects chiefly the head and upper extremities and is often less marked in the lower parts of the body. The cervical veins stand out prominently and when tricuspid regurgitation sets in there may be added the usual features of that state. Dyspenoea in the earlier stages is to be attributed to the diminished aerating surface of the lungs, but even here as Brugsch's observations indicate it is also partly cardiac. In the advanced stages it becomes extremely urgent, being more or less constant and with paroxysmal exacerbations. Relief is sought in assuming the erect posture, in leaning forward, or as in one of my cases by kneeling and leaning forward on a chair.

Oedema of the legs and serous cavities is usually present in varying degrees depending doubtless on the degree of insufficiency of the right heart.

Although cardiac failures is usually a gradual process extending over months or even several years, a rapid termination occurs in some cases after the onset of symptoms. In my second

case only ten days elapsed between the onset of symptoms and the fatal termination.

It is well recognized that individuals with much thoracic deformity seldom attain old age. Most of them are carried off by pulmonary complications to which cardiac changes are an important contributory cause. Cardiac disease is responsible for no inconsiderable number of deaths occurring about middle life and often carrying the patient off before attaining an age much over fifty.

Treatment in advanced cases can only be symptomatic and is then often usually futile. To avoid such conditions by early treatment of the spinal affection forms our only efficient method of action.

GANGLION OF THE WRIST REGION WITH REPORT OF TWO CASES SHOWING DESTRUCTIVE TENDON INVOLVEMENT

HERBERT P. H. GALLOWAY, M.D., C.M., F.A.C.S.

Winnipeg

TWO distinct types of ganglion are of frequent occurrence in the neighborhood of the wrist. (a) The simple circumscribed non-tuberculous ganglion, (b) The compound or diffuse tuberculous ganglion. The two conditions are sometimes confused, although both clinically and pathologically they are quite distinct. The simple ganglion is a rounded semi-fluctuating swelling varying in size from a pea to a small walnut, which may appear almost anywhere in the neighborhood of the wrist but is most frequently seen on its radial side. It consists of a fibrous cyst wall with an endothelial lining; its contents are translucent, jelly-like in consistence and in appearance not unlike white of egg. The tumor, when grasped through the skin, can be moved slightly, but the underlying tendons, when put into action move independently of it.

These small cysts are intimately connected with the fibrous coverings of tendon sheaths, or with the ligaments of the wrist or carpal joints, and may communicate with the interior of a sheath or of a joint cavity. Sometimes they seem to result from a sprain or other injury, and are frequently observed in musicians or persons following occupations requiring habitual overuse of the muscles controlling the wrist and fingers. They are more commonly seen in females than in males.

Opinion varies as to the mode of origin of the simple ganglion. The most reasonable explanation is that originally it is a pouch-like protusion from a tendon sheath or from the wrist or one of the carpal articulations, the synovial membrane gradually protruding through some weakened portion of the fibrous envelope within which it lies; the protrusion gradually enlarges, becoming a cystic tumor lying on the fibrous coverings of the tendon or joint but not necessarily communicating with the synovial cavity from which it originated.

The simple ganglion occasions a feeling of weakness and discomfort rather than actual pain; the patient is conscious less of suffering than of slightly diminished efficiency.

The compound diffuse ganglion is a totally different affection and almost invariably represents a chronic tuberculous process affecting the tendon sheaths. While it sometimes attacks the sheaths of the extensor tendons, it is seen much more frequently on the volar aspect of the wrist and lower part of the forearm, extending beneath the anterior annular ligament into the palm.

On examination one finds a fluctuating swelling on the front of the wrist extending downward into the palm and upward a variable distance in the lower part of the forearm. On manipulating the swelling a characteristic soft crepitation is felt and it is apparent that a portion of the contents of the swelling can be pressed upward

and downward beneath the anterior annular ligament.

When the swelling is opened it is found to be crowded with small "melon-seed" or "rice" bodies. These are very numerous and of variable size. They are of a whitish colour and have a smooth polished surface. It is the movement of these particles upon one another and upon the limiting walls of the tumor which causes the characteristic crepitation referred to as occurring when the swelling is manipulated or the wrist and fingers are voluntarily flexed and extended.

Treatment

There is but one certain and satisfactory treatment of either the simple or the compound ganglion—complete extirpation by careful dissection. At one time it was a common practice to rupture a simple ganglion by pressure with the thumbs or by a sharp blow, but such crude and unscientific practice should not be countenanced. Neither should reliance be placed upon the timid and uncertain method of evacuating the contents of the swelling by puncturing it with a tenotome, expressing its contents and then attempting to produce adhesion of the walls of the cyst by blindly scarifying its interior and applying a pad and bandage. Cures have been brought about by the use of an aseptic seton, but one seldom sees this method used at the present time. Under strict aseptic precautions, and after the part has been rendered bloodless, the swelling should be exposed and delicately dissected away from surrounding tissues. Usually it will be found that the ultimate boundaries of the tumor are much deeper and more extensive than would be suspected from its external appearance, and in some cases the attachments must be followed deeply into the radio-carpal joint or between the carpal articulations. By patience and care the tumor can be completely removed and quite frequently this may be accomplished without puncturing its walls.

In operating on the large tuberculosis ganglion a minute knowledge of the anatomy of the part, and uncompromising thoroughness in the removal of every vestige of diseased tissue are essential to success. If the disease be extensive, involving the palm and extending well above the wrist, the surgeon may have to work industriously for two hours before the operation is complete. A bloodless field saves a great deal of time and renders the operation easier and more thorough, and in order to secure this with a minimum risk of "Esmarch bandage paralysis" I have found the following method very useful:

Two pieces of soft rubber tubing, three-eighths to half an inch in diameter and a foot in length are boiled with the instruments. After a final painting of the hand and arm with iodine an assistant elevates the extremity for a moment by grasping the fingers with one hand while two or three fingers of his other hand are applied to the patient's radial artery. Then the surgeon makes two or three turns of the rubber tube around the arm three or four inches above the elbow, and gradually draws the tube just tight enough to obliterate the radial pulse, the assistant informing him when the pulse can no longer be felt. When in the surgeon's opinion the operation is about half complete the second tube is applied to the forearm a short distance below the elbow, after which the upper tube is removed. This simple procedure reduces by fifty per cent. the time during which any one portion of the nerve trunks is subjected to pressure by the tourniquet, thus greatly lessening the risk of muscular paralysis.

It is impossible to lay down strict rules as to how the dissection shall proceed; in a general way it is wise to follow as closely as is possible the natural creases in the palm. Complete removal of diseased tissue with a minimum of injury to healthy tissues must be the guiding principle throughout. An incision starting midway between the elbow and the wrist is carried down along the middle of the anterior surface of the forearm, and after crossing the wrist is continued along the palmar boundary of the thenar eminence to the base of the thumb, and then along the palmar surface of the thumb to within an inch of its end. A second incision is then carried from the base of the little finger along the palmar boundary of the hypothenar eminence so as to intersect the first incision at the point where the latter begins to curve towards the thumb; together these incisions will permit the raising of flaps sufficiently extensive to give all the exposure required for most cases. If necessary, however, the disease must be followed into the individual digits.

With the tissues bloodless no difficulty will be experienced in distinguishing the diseased from the healthy tissues; the greatest care and delicacy must be exercised so as not to injure the nerves in the palm of the hand. The vessels of the superficial palmar arch will be sacrificed, but the deep palmar arch need not be injured.

No hesitation need be felt about completely dividing the anterior annular ligament, and it is impossible to do the operation thoroughly without cutting this structure.

My personal preference is to complete the palmar dissection first, and then follow the disease into wrist and forearm region, and should the disease be found to involve the muscles of the forearm the operator must not feel satisfied until every vestige of suspicious muscular tissue has been extirpated. Not only must the diseased sheath be thoroughly removed, but the tendons themselves must be carefully examined. It is an astonishing fact that such masses of tendons as those on the flexor and extensor surfaces of the wrist may for years glide up and down through the pulpy mass of tuberculous tissue in which they are embedded without showing the slightest evidence of disease, their smooth glistening appearance and tensile strength being fully maintained. So usual is this that one is apt to forget the well established fact that the tendons themselves may finally fall a prey to the destructive process. After first gaining a foothold on the surface of the tendon the granulation tissue gradually insinuates itself between the bundles of fibrous tissue, disintegrating and weakening them until finally the continuity of the tendon is interrupted. In the two cases reported in this paper it was noted before operation that the patient was unable to flex the terminal joint of the thumb, a fact which was easily explained at the operation, as in that portion of the tendon of the flexor longus pollicis which is hidden by the thenar eminence there was found an actual gap over one inch in length, the proximal and distal remains of the tendon on each side of this gap appearing as soft, attenuated, dirty yellowish cords with pointed ends. In the first case several of the tendons of the flexor sublimis were similarly diseased.

If only the surface of a tendon is diseased, a thin slice, which includes all the pathological tissue, can be removed from the tendon by a sharp knife, but in the exceptional cases, where the tendon has been destroyed, one has no choice but to remove all the diseased tissue at the expense of subsequent impaired function.

After controlling hemorrhage the annular ligament should be carefully sutured with catgut and the skin edges brought together very accurately with silkworm gut. A dressing is then applied with the hand in such position as to relax the tendons on the side operated upon; thus if the operation has been on the palmar tendons the wound will be dressed with the hand in a flexed position, and vice versa, the object being to make it easier to stretch or break down any adhesions which may follow the operation.

Very gentle passive movement may be begun about the third day and should be carried out once daily afterwards. After complete healing has occurred, which may take ten to fourteen days, radiant heat, massage and systematic exercises will assist in restoring function.

Results of Operation

Provided that the operation has been sufficiently thorough and the wound remains aseptic, the results of the operation are usually most gratifying. It seems incredible but is nevertheless true, that after extensive operations of the kind outlined, practically complete functional restoration is the rule. Cases have been reported where after complete extirpation of a large palmar ganglion a patient who was able to play the piano or violin could resume his practice without inconvenience.

F. P., 26 years. Farmer. History of trouble in his left hand and wrist extending back fifteen years. It had been gradually getting worse and interfered very much with his work. He did not suffer acute pain but the hand was very inefficient and he was compelled to use it guardedly. On examination a large swelling was found occupying the lower third of the volar surface of the forearm and the palm of the hand, which was also much swollen, particularly in the neighbourhood of the thenar eminence and the base of the thumb. Voluntary movements were not particularly painful. When the swelling was manipulated it was found to be soft and semi-fluctuant, and the peculiar characteristic crepitation produced by the "rice bodies" of a tuberculous palmar ganglion was very pronounced.

At operation the swelling was found to consist of an envelope of thickened synovial membrane filled with a small amount of fluid and innumerable "rice bodies." In order to remove all the diseased tissue it was necessary to make a complete dissection of the palm of the hand and of the forearm half way up to the elbow, which was done in the way already indicated. The long flexor tendon of the thumb, and also several tendons of the flexor sublimis had been so far destroyed that their continuity was interrupted.

There was primary healing throughout. Patient was encouraged to use the fingers voluntarily even before the sutures were removed. At the end of two weeks treatment by radiant heat and massage was begun. The function of the hand improved very rapidly and the patient left for his home in three weeks.

Mr. J. S., 30 years. Male: History of discomfort and gradually increasing swelling in the right hand extending back about eight years and gradually getting worse. Clinically the case was practically identical with case No. 1. Patient was unable to flex the terminal phalanx of his thumb, but the function of the other fingers appeared to be unimpaired. The operation was practically the same as in case No. 1, except that no removal of the sublimis tendons was required as they were free from disease.

On carefully following the tendon of the long flexor of the thumb its continuity was found interrupted just proximal to the metacarpophalangeal junction, and for about one inch on either side of this point the tendon was represented by a soft, yellowish, sloughy pointed cord. In this case, after removing the diseased portion of tendon an attempt was made to restore continuity by turning down a long slender strip from the healthy proximal portion of the tendon and uniting it to the healthy distal stump of the tendon, but the subsequent history showed that this attempt was attended with little success.

After completely extirpating the diseased tissue from both the palm of the hand and the lower half of the forearm, the wound was closed after arresting hemorrhage, and subsequent treatment carried out largely as described in case No. 1. The functional result was excellent.

THE CAUSE OF THE "AMMONIACAL DIAPER"

A. P. Hart, M.B.

Research Fellow, Department Pediatrics, University of Toronto

From the Wards and Nutritional Research Laboratory, Hospital for Sick Children and the Department of Pediatrics, University of Toronto.

ALTHOUGH the "ammoniacal diaper" has recently been the subject of considerable discussion on this continent, there still seems to be a good deal of uncertainty as to its cause and of a consequence there is a lack of definiteness and confidence in its treatment.

In beginning an investigation of this condition, one was soon impressed by the fact that there were practically no instances of it within the wards of the hospital although such cases were being constantly met with in private practice throughout the city, and in spite of the fact that mothers coming to the Out Patient department frequently reported the existence of this trouble in their infants. Sometimes it was merely the strong odour for which they sought a remedy, one saying that the other children called the baby the "ammonia factory," another that the "bed room smelled strongly of ammonia, and that on removing the diaper in the morning it was like opening an ammonia bottle, making the eyes water." Frequently, even if no other symptoms had developed, the mother was found to fear that something must be wrong with the baby, although healthy and doing well. Perhaps more often the children were brought because of a rash which has been so well described by Zahorsky[1] in his admirable article upon the "ammoniacal diaper." This rash has a distinctive appearance. It is confined to the diaper region and appears characteristically as an eruption which has been vesicular but in which the vesicles have broken and dried, giving the picture of small superficial but punched out ulcers with a dry parchment-like covering and frequently, with indurated margins. It is usually most intense over the buttocks and back where the child has been lying upon the diaper but the anterior surface of the abdomen and inner surfaces of the thighs which have been in

contact with the diaper also exhibit the condition. The rash, however, may not be so well marked as in the description, and may vary in degree from slight redness, to vesiculation, or to the more frequently seen eruption described above.

Another, by no means uncommon reason for mothers seeking advice,was the ulcerated meatus which sometimes follows circumcision. This is mentioned by Zahorsky, and is fully described by Brenneman[2] in a recent article: Briefly described, this condition usually commences as a blister, seldom seen unruptured, at the meatus, which leads to ulceration, painful urination, crusting over of the meatal opening, at times hæmorrhage, and frequently a distended bladder. Occasionally a mother came to ask what she could do to remedy the odour which came from the bed of a child troubled with enuresis.

Observations

Despite the frequency of the condition outside the hospital only two cases of it occurred in the wards over a period of three months. In the first case the nurse noticed and reported a slight but distinct smell of ammonia on the diaper in the morning. A fresh specimen of urine was collected in a sterile container. It was noticed to be slightly opalescent. A very faint odour of ammonia was thought to be detected coming from the urine in the container although in the cases investigated later it was not possible to detect ammonia from the urine in a vessel. The uncentrifuged specimen showed under the microscope numerous bacilli with about two pus cells to a high power field. A day or two later a catheter specimen was markedly opalescent and revealed many bacilli with eight to ten pus cells to a high power field in the uncentrifuged specimen. From this specimen, a culture was made which grew pure bacillus coli. No micrococci were grown in culture. It is interesting to note that in this case the odour of ammonia was noticed on the diaper at an early stage in the pyelitis, which was found to be present when there were only about two pus cells to the field and when it was difficult indeed to make the later determined diagnosis. Zahorsky states that the ammoniacal diaper is a frequent precursor of pyelo-cystitis in female infants. In this child, a female, the odour which first appeared after the child had been in hospital some time was coincident with a marked bacilluria and the evidence in this case was certainly that the bacilli were producing the ammonia. In the second hospital case another female infant, a faint smell of ammonia was noticed on the diaper in the morning. A specimen of urine was collected as soon as possible and was found to be swarming with motile rod-like bacilli. There were no pus cells present. A catheter specimen was clear and contained neither bacilli nor pus cells. After thorough cleansing of the external parts the condition did not recur. In this case the contamination evidently came from the external parts.

There were two facts about the occurrence of the ammoniacal diaper that seemed very significant. First there were very few cases within the wards of the hospital. Secondly, although the children were admitted with a constant history of an ammoniacal diaper, and although frequently they were kept on the same feeding, the condition did not occur in hospital. These observations seemed to be strong evidence that the trouble arose from an external factor and not from any error in metabolism. About this time appeared Brenneman's article reviewing Zahorsky's work, giving further support to the idea of an external factor being the cause, and suggesting further that it was largely an alkali in the diaper. In order to investigate this possibility, two diapers were taken, one an ordinary hospital diaper which had been washed and sterilized in the usual hospital manner, and another similar diaper washed with a well known widely used preparation of soap flakes, and incompletely rinsed so as to leave some soap in the diaper. To each was added 30 c.c. of urine from a normal healthy adult. The diapers were wrapped separately in rubber sheeting and left in the incubator at body temperature for three quarters of an hour. On removal of the packages from the incubator and on unwrapping the rubber sheeting a strong odour of ammonia came from the diaper washed with soap flakes while the hospital diaper gave off no odour whatever.

Following another line of investigation urines were collected from children of different ages who were on the feedings shown in the following table. The ammonaia was determined and computed for 25 c.c., using the Van Slyke and Cullen aeration apparatus. Twenty-five c.c. of urine was then added to diapers which had been washed with washing soda and incompletely rinsed. The diaper was wrapped in rubber sheeting and left in a warm place for thirty

OBSERVATIONS ON CHILDREN UNDER THREE MONTHS OF AGE

Case	Age	Feeding Percentages of Fat Carbo-Prot. Hydrate	Quantity	Treatment of Diaper	Odour of Ammonia after ½ hr.	Effect on moistened red litmus paper	Grams of Ammonia in 25 c.c. of urine
K–	1 mth.	4, 7, 1 (Artificial)	2½ ozs. q3h x 7	Washed with washing soda and incompletely rinsed, 25 c.c. urine added, wrapped in rubber sheeting and left on warm radiator thirty minutes	No odour	No action	.00238
L–	6 wks.	4, 7, 1 (Artificial)	2 ozs q3h x 7		" "	" "	.0076
N–	14 dys.	4, 7, 1 (Breast)	....		" "	" "	.0034
G–	7 wks.	4, 7, 1 (Breast) remainder made up 4, 7, 1 (Artificial)	6-8 ozs. 2 ozs. q3h x 7		Very slight odour	Ft. blue	.00807
H–	11 wks.	.7,1.1, 1.2 (Artificial)	3½ ozs. q3hx5		" "	" "	.0068
T–	14 wks.	.7, .7, 1.6 (Artificial) 4, 7, 1 (Breast)	4 ozs. q3h x 7 6-10 ozs.		" "	" "	.00425
H.K.–	9 wks.	.7, .7, 1.6 (Artificial)	3 ozs. q3h x 7		No odour	No action	.00297
R.K-	9 wks.	.7, .7, 1.6 (Artificial)	3 ozs. q3h x 7		Very slight	Ftly. blue	.0051
W-	9 wks.	1.4, 6.25, 1.6 (Artificial)	3 ozs. q3h x 7		No odour	No action	.0038
C–	9 wks.	4, 7, 1 (Breast)	....		Ft. odour	Ftly. blue	.0127

OBSERVATIONS ON CHILDREN FROM 3 TO 20 MONTHS

Case	Age	Feeding Percentages of Fat Carbo-Prot. Hydrate	Quantity	Treatment of Diaper	Odour of Ammonia after ½ hr.	Effect on moistened red litmus paper	Grams of Ammonia in 25 c.c. of urine
P-	10½ mths	3, 5.8, 2.8 (Artificial)	8 ozs. q 4 hx5	Washed with washing soda and incompletely rinsed, 25 c.c. urine added, wrapped in rubber sheeting and left on warm radiator thirty minutes	Distinct	Marked	.01105
H–	8½ mths.	4, 7, 1 made up to 40 ozs. in 24 hrs. by artificial mixture 3, 5.8, 2.8.	16 ozs.		"	"	.00935
R-	4½ mths.	4, 7, 1 (Artificial)	3 ozs. q3h x 7		"	"	.017
R–	4½ mths.	4, 7, 1 (Artificial)	3 ozs. q3h x 7		Quite strong	"	.020825
D.H.–	20 mths.	Full diet for age	....		Distinct	"	.0102
S–	18 mths.	3, 5.8, 2.8 (Artificial)	8 ozs. q4h x 4		"	"	.01615
P–	18 mths.	2, 4.5, 3.5 (Artificial) Cereal Milk Mixture	8 ozs. q4h x 5 1 oz. T.I.D.		"	"	.01317
P–	3 mths.	1.6, 8.4, 2.8 (Artificial)	4 ozs. q4h x 6		"	"	.01445
S–	16 mths.	3, 9.8, 3. 5(Artificial)	8 ozs. q4h x 6		"	"	.0225
C– ...	3 mths.	.7, .7, 1.6 (Artificial)	4 ozs. q3h x 5		"	"	.01487

OBSERVATIONS ON OLDER CHILDREN

Case	Age	Feeding	Medicine	Treatment of Diaper	Odour	Effect on moistened red litmus paper	Grams of Ammonia in 25 c.c. of urine
S-	5 yrs.	Soft diet	None	Washed with washing soda and incompletely rinsed. 25 c.c. urine added, wrapped in rubber sheeting and left on warm radiator thirty minutes	Ammoniacal	Turns blue	.0306
R–	7 yrs.	Full hospital diet	"		"	" "	.017
K–	11 yrs.	" " "	"		"	" "	.0157
K–	11 yrs.	" " "	"		"	" "	.0140
B–	12 yrs.	" " "	"		"	" "	.00935
O-	7 yrs.	Cardiac (baked potatoes, steak, custard, chicken)	Sod. Sal. 12 grs. Sod. Bicarb. 24 grs. q4h x 5		Faintly ammoniacal	Turns ftly. blue	.0085
G–	6 yrs.	Soft diet	Sod. Sal. 8 grs. Sod. Bicarb. 16 grs. q4h x 5		" "	" " "	.0097
L–	12 yrs.	" "	Sod. Sal. 15 grs. Sod. Bicarb. 30 grs. q4h x 5		Very faintly ammoniacal	" " "	.0055
V–	8 yrs.	" "	Sod. Sal. 10 grs. Sod. Bicarb. 20 grs. q4h x 5		" " "	" " "	.00467

minutes. The odour and the effect on moistened red litmus paper, held above but not in contact with the diaper immediately the rubber sheeting was unwrapped, were noted and recorded. Washing soda was used in preference to soap because it facilitated the maintenance of a more uniform condition in the diaper throughout the observations. The aim was to leave the diaper no more strongly alkaline than it might easily be if washed with soap.

It will be noted from the tables that in practically all the cases where the children were on a fairly liberal diet and were over three months of age, ammonia was given off from the diapers in sufficient quantity to give a definite odour and to turn moistened red litmus paper blue. In most of the infants under 3 months of age, as seen in Table 1, the quantity of ammonia excreted as ammonium salts was so small that the odour was either not detectable or only faintly so, and the action on litmus was slight. The fact that the ammoniacal diaper is seldom observed in the very young infant can be accounted for by the fact that their excretion of ammonia is so small that even if the external conditions are such as to liberate this ammonia its quantity is not sufficient to attract attention. Similarly if the diet is so low that ammonium salts are excreted in small amount the ammonia odour is not noticed. This accounts for the results obtained by some clinicians when they use a gruel diet as a means of treatment for the ammoniacal diaper. However, if we recognize that the factors which cause the breaking down of these ammonium salts and the liberation of free ammonia are due to external factors it will be self-evident that the treatment of the condition by partial starvation is an unnecessarily severe as well as an irrational treatment, although there is no doubt that it will temporarily get rid of the trouble so long as the food is kept low enough. It will be noticed from Table 3 that the excretion of ammonia as ammonium salts is higher in the older children, except in those cases who were having large doses of soda bicarbonate and sodium salicylate. In the latter cases the smell of ammonia from the diaper was slight. This is only what one would expect from the fact that, other things being equal, alkali intake decreases the excretion of ammonia and is contrary to Zahorsky's observation that alkalies have no effect upon the ammoniacal diaper. Clinically we have often found that on the administration of large doses of potassium citrate the ammoniacal diaper has disappeared, this of course is simply due to the fact that the ammonia execreted as ammonium salts is so low that the odour is not detected. Personally, I have not found any cases in which the administration of alkalies aggravated the condition. I can, however, quite believe that if there were still enough ammonia being excreted as ammonium salts and the external factors were present to liberate it that the condition might still persist while alkalies were being administered.

Although it seemed self-evident that the administration of alkalies would decrease the excretion of ammonium salts in the urine, yet in order to test it urines were collected from three children and the ammonia was estimated. They were then given potassium citrate 20 grs. for three doses. The urine was collected at approximately the same time of day following the administration of potassium citrate and the ammonia again estimated. As will be seen by the table, the results show a lowered excretion of ammonia as ammonium salts in all cases, although the potassium citrate was given for such a short period.

Case	Age	Feeding percentages of Fat, Sugar Prot.	Ammonia in grams from 5c.c. urine	Ammonia in grams from 25 c.c. urine	Ammonia in grams from 5 c.c. urine after giving potassium citrate 22 grs. q4h for 3 doses	Ammonia in grams from 25 c.c. after 3 doses potassium citrate.
W–	6 mths.	4, 7, 1 (Breast), supplemented if necessary by artificial mixture 12, 4.7, 1.80, 8 ozs. q4h x 5.	.0017	.0085	.0014	.007
S–	9½ mths.	3.3, 3.7, 3, 8 ozs. q4h x 5. Cereal Milk Mixture 1 oz. t.i.d.	.00102	.0051	.00085	.00425
C–	10 wks.	4, 7, 1 (Breast), supplemented if necessary by artificial mixture 2, 5.7, 2.1, 4 ozs. q3h x 7.	.00233	.01165	.00025	.00125

In order to test for the quantity of ammonia which would come off from urine with diapers treated by washing in washing soda and incompletely rinsed a square portion was removed from a diaper so treated, and was placed in a Van Slyke and Cullen's aeration tube, 10 c.c. of urine were added. The tube was quickly corked, connected up to the tube containing n/20 HCL for taking up the ammonia and a clamp placed on the rubber tubing connected with the aeration tube so that no ammonia could escape. This was allowed to stand in a warm place beside the radiator for one hour as had been the procedure with the diapers in the first experiment. Aeration was then carried out in the usual way and the amount of ammonia estimated. Ten c.c. of a half saturated solution of potassium carbonate was then added to the tube and aeration carried out again. At the same time the ammonia content of another sample of the same urine was estimated using the Van Slyke and Cullen apparatus in the usual way. It will be seen from the first table that 35 to 53.7% of the total ammonia came over from the diaper alone and the aeration was necessarily very imperfect as there was not sufficient fluid to get even approximately complete aeration. In the experiment reported in the second table 20 c.c. of distilled water were added in order to have better aeration. It will be noted that the percentages of ammonia recovered from the diaper and urine without added alkali and the total percentages recovered are much higher although even here the conditions for aeration were not perfect, as the cloth had to be packed down into the bottom of the tube so as to have fluid above through which to aerate. These tables show, however, that a large percentage of ammonia comes off from the urine on a diaper which has been washed with washing soda and insufficiently rinsed.

Despite the fact that the profession as a whole do not seem to have accepted Zahorsky's idea that the ammoniacal diaper is due to alkali left in it (probably owing to the fact that he offered no proof) it became more and more evident to the author that this was the principle factor in the production of this troublesome condition. All of several cases from the out patient department had responded to thorough rinsing of soap from the diapers, although in one or two of them it was necessary to impress the mothers on their second visit with the importance of seeing that this was done with each and every diaper. Concerning two cases the mothers reported the condition as better but that there was still some odour. However, after duly impressing them with the minor points and getting their co-opera-

TABLE 1

Case	Ammonia from 10 c.c. of Urine	Ammonia from Diaper roughly rinsed and 10 c.c. of Urine	Percentage recovered from Diaper and Urine	Ammonia from Urine and Diaper after adding 10 c.c. of half saturated sol. Pot. Carb.	Total Ammonia recovered	Total percentage recovered from Diaper and Urine and Pot. Carb.
	Grams	Grams		Grams	Grams	
R–	.01122	.005695	50.7%	.002635	.00833	74.2%
R–	.00357	.001785	50%	.00102	.002805	78.6%
W–	.00649	.003485	53.7%	.0018	.005285	81.4%
B–	.0034	.00119	35%	.00102	.00221	65%

TABLE 2

Case	Ammonia from 10 c.c. of Urine	Ammonia from Diaper washed in washing soda and roughly rinsed, plus 20 c.c. distilled water and 10 c.c. Urine	Percentage recovered from Diaper and Urine	Ammonia from Urine and Diaper plus distilled water after adding 10 c.c. half saturated Pot. Carb.	Total Ammonia recovered	Total percentage recovered from Diaper and Urine and Pot. Carb.
	Grams	Grams		Grams	Grams	
W–	.002890	.00221	76.4%	.000425	.002635	91.1%
A–	.00799	.0044	55%	.00178	.00618	77.3%
C–	.00238	.00102	43%	.000765	.001785	75%
Mc–	.00289	.002125	73%	.000595	.00272	94%
P–	.01122	.004675	41.6%	.004335	.00901	80.3%

tion we had the satisfaction of seeing the conditions clear up in all cases after thorough rinsing, and in a few cases after boiling the diapers.

About this time a friend in practice enquired what he could do for a little patient who had a rash on the buttocks, and from whose diapers persistently came such a strong smell of ammonia that the room reeked of it. It was suggested that a less alkaline soap be used and that careful supervision of the rinsing be carried out. Ten days later it was reported that the condition had entirely disappeared. The strong smell of ammonia ceased at once upon treating the diaper. The rash which had been quite bad subsided without receiving local treatment. A month or two later it was reported that the odour was back again. This time the bed was the worst offender. It was advised that the bedding and pad be treated as were the diapers and that all be thoroughly boiled on the chance that contaminating micro-organisms present might be a factor in causing the ammoniacal odour. The mother, who herself supervised the washing and boiling, reported that all the offensiveness disappeared as soon as this was done. This case has been carefully watched up to the present and there has been no return of the condition.

The following cases are of interest:—

Case 1. A.P., male, age 1 year. Came to O.P.D. February 10, 1921. The mother had noticed for some time a strong smell of ammonia on changing the diaper. This was most marked in the morning or if there has not been an opportunity to change diapers at the usual time. The mother had been washing the diapers with a preparation of soap flakes. She was advised to change the soap and to rinse the diapers thoroughly in four waters.

February 14, 1921. No smell of ammonia since diapers have been carefully rinsed. Specimen urine examined shows:

Ammonia per 100 c.c..... .0153 gms.
Ammonia from urea ammonia per 100 c.c. .306 gms.
Ammonia urea ratio—1 : 19

February 17, 1921. Since last visit only one diaper on which ammonia could be detected, and that only faintly so after 4½ hours in park where it could not be changed.

Case 2. R.M., male, age 9 months. Came to O.P.D., February 16, 1921. Family history nil. Personal history. Has had discharge from both ears since Christmas. Brought to hospital because of rash on the buttocks and sore at the margin of the foreskin which commenced as a small blister but is now a small ulcer. The mother has noticed a strong smell of ammonia on the diapers for some time but is not certain how long. She thinks two or three months. The diaper has been ammoniacal every time she changed it. Fed on condensed milk until eight months old. When brought to O.P.D. one month ago put on skim milk 25 oz., water 15 oz., lactose ½ oz. 8 oz. q. 4h x 5. Odour disappeared for about one week. Then fed skim milk 30 oz., water 10 oz., dextro maltose ½ oz. 8 ounces q. 4h x 5. Cereal milk mixture 2 oz. t.i.d., and is now having skim milk 40 oz., dextro maltose 2 oz.—8 oz., q. 4h x 5. Cereal Milk Mixture 2 oz. t.i.d. Cod Liver Oil and Malt 10 m. t.i.d. After the first week of attending hospital, during which the odour of ammonia disappeared, the infant improved and has been getting stronger as the food has been increased.

Urine—acid
Ammonia in 100 c.c..... .0272 gms.
Ammonia from urea and ammonia in 100 c.c..... .714 gms.
Ammonia Ratio 1 : 27
Acidity 2.2 n/10 alkali to 10 c.c.

February 23rd. As instructed the diapers have been washed with a good laundry soap and well rinsed. There has been practically no odour of ammonia from the diapers and if any it has only been in the morning after the diaper had been on all night. Rash has entirely disappeared and ulcer is healed. There has been no local treatment. Child needs circumcision.

March 27th. There has been no return of rash and no smell of ammonia from the diapers.

Case 3. D.H., female, age 20 months. Referred on account of ill-smelling diapers. February 16th, 1921. Breast fed 6 weeks, then Eagle Brand Condensed Milk according to directions. Is now having same diet as the family. Has had a rash over diaper region which first appeared for 4-5 months as little blisters. Has had a strongly ammoniacal diaper for 4-5 months. "It is so strong in the morning that it almost chokes you." Otherwise child is strong and healthy. In washing the diapers the mother has always used an ordinary laundry soap, rinsing them once afterwards. Mother instructed to rinse the diapers four times after washing.

February 21st, 1921. Much better. Occasionally slight smell of ammonia in the morning or after the diaper has been on a long time. The rash is disappearing. To boil diapers.

February 24th, 1921. Scarcely ever any smell of ammonia now. Rash almost gone.

Case 4. I.H., female, age 7 months, sister of case 3. Referred on account of ill-smelling diapers, February 16th, 1921. Being fed on cow's milk 4½ oz., water 2 oz., q. 4h. x 6. Has had a rash over the diaper region for 3 or 4 months. The diaper has smelled of ammonia for about the same length of time but not nearly so strongly as did the diapers of the older child. February 21st, 1921. Diaper smells slightly of ammonia in the morning or after it has been on a long time. Rash better. February 24th, 1921. No smell of ammonia. Rash better.

It was exceedingly difficult to get intelligent co-operation from the mother of this infant and it was difficult to get perfectly clear and definite statements.

Case 5. D.H., male, age 2 years. Referred for ammoniacal diaper March 12th, 1921. Has been fed largely upon milk food and soup, with a very little bread or porridge. Complains of an ulcer of the meatus which crusts over so that he cannot pass urine. Condition present for 2 months. Mother has to make him pass water and has to bathe off the crust before he can do so. Has a slight ammoniacal rash over the lower anterior surface of the abdomen and has three ulcers upon the buttocks. The rash consists of small superficial ulcers with slightly indurated edges and with a parchment-like scale over the centre of the ulcer. This has been present for only a few days. The mother has noticed a strong smell of ammonia on the diapers for the last 13 months. Has been using the soap flakes already referred to for washing the diapers. We advised her to wash the diapers with a good laundry soap and to see that they were thoroughly rinsed.

March 14th. There has been no smell of ammonia from the diapers since the careful rinsing has been carried out. The ulcer of the meatus is healed. Rash is fading.

Twenty-four hour specimen of urine, 340 c.c.
Ammonia from urea and ammonia using arease method with Van Slyke & Cullen apparatus ..... 3.4689 gms.
Ammonia ..... .20808 gms.
Ratio 1 : 16

March 17th, 1921. No return of ammoniacal odour, the rash or dysuria.

March 26th, 1921. There has been no return of symptoms.

Case 6. W.S., male, age 16 months. Referred for ammoniacal diaper. February 28th, 1921. Mother died when baby 9 days old. Being kept by foster mother. Fed on whole milk and water mixture until 5 months of age. He was always constipated and never thrived. Only weighed 6½ lbs. when three months old. He was brought to the Out Patient Department on August 12th and put on Lactic Acid Milk, the strength of which was gradually increased. Since being on this feeding has gained weight. The smell of ammonia has been noticed coming from the diaper on and off since August. It has become much more marked since the strength of the feedings has been increased and particularly since barley flour has been added, after which a rash appeared on the buttocks. The mother states that she has not been using any soap in washing the diapers. In order to investigate this case, it was admitted to hospital and kept upon exactly the same feeding as it had been having outside. No smell of ammonia could be detected from any of the diapers after admission to hospital.

Specimen of urine for 24 hours, 263 c.c., collected in bottle and surrounded with ice acid, many bacilli, only an occasional pus cell.

Ammonia from 5 c.c. ..... .0045 gms.
Ammonia from 24 hr. specimen ..... .2367 gms.
Ammonia from urea ammonia from salts from ½ c.c. urine ..... .007225 gms
Ammonia from urea ammonia from salts from 5 c.c. urine ..... .07225 gms.
Ammonia from urea ammonia from salts from 24 hr. specimen ..... 3.80 gms.
Catheter specimen contained no bacilli

Discussion

This last case was looked upon by the Out Patient Physician as strong evidence against the idea that alkali in the diaper was the cause of the ammoniacal odour; there was never any smell of ammonia from the diapers after his admission to hospital. The bacilli present in the specimen collected evidently did not greatly comtaminate the diaper or had not been there sufficiently long to free ammonia.

An incident occurring a few days ago is of interest. An attending physician reported an ammoniacal diaper on the ward and asked how this could be reconciled with the idea upon which we were working. The diaper which had been saved certainly had an ammoniacal odour but contained a loose, pale-gray, pasty stool, the organisms of the faeces were most probably responsible for the odour of ammonia. The condition did not recur although the diapers were carefully observed for some time.

It will be noted from the reports on these children with ammoniacal diapers that the excretion of ammonia as ammonium salts was not abnormally high and that the ammonia urea ratio was normal in all of the cases. Cases 2 and 4 illustrate particularly well the fact that as the feeding was increased in strength the symptoms became more marked. As was pointed out earlier more ammonia is excreted on a liberal diet than on a low one. None of these cases were on a high fat diet and Southworth's[3] contention that the ammoniacal diaper was due to fat in the diet has not been borne out by these investigations. Cases 4 and 5 are instructive in showing that one may meet with difficulty in getting mothers to take the necessary care and to persist in it long enough to get all alkali out of the diapers, or to see that they are cleansed of gross contaminations with excreted organisms.

Conclusions

In conclusion it seems clear that the ammoniacal diaper is due to external causes, of which the first and by far the most frequent is that an alkali is left in the diaper after washing. The second and a not altogether infrequent cause is contamination of the urine with organisms either from an infection of the genito-urinary tract or from some contamination from the outside. The free ammonia which gives rise to the odour comes largely from the breaking down of ammonium salts in the urine so that amongst the factors which will influence the condition will be a liberal diet. A child on a full diet excretes more ammonium as ammonium salts than does one on a limited diet and as has been seen, starvation treatment temporarily cures the condition. More or less correlated with this factor will be the age. In very young infants the condition is seldom met with, it is more marked in older children, who take more food. The acidity of the urine will play a part in that a urine which is near the neutral point will become alkaline and liberate ammonia much more readily, if either of the two external causes are present than will a highly acid urine. The administration of large doses of alkalies, however, will exert an influence by decreasing the excretion of ammonium salts. The concentration of the urine will also play a part, as a highly concentrated urine (one in which ammonium salts are also likely to be in greater concentration) will give off more free ammonia. However when it is recognized that the ammoniacal diaper is due to external factors, and is not indicative of any pathological condition in the child, and when it is further recognized that these external factors (the alkali of the diaper and contaminating bacteria) can be removed by thoroughly rinsing for the one and boiling for the other and the condition thereby entirely relieved then it will be evident from the standpoint of therapeutics that we need not consider all of the minor details which may influence the excretion of ammonia.

I desire to express my thanks for the very valuable suggestions from and help by Miss A. M. Courtney, Professor Harding and Dr. Alan Brown.

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TUBERCULOUS PERITONITIS

GEORGE EWART WILSON. M.B., F.R.C.S., ENG., F.A.C.S.

Toronto

WHILE the existence of chronic effusions in the peritoneal cavity was recognized centuries before the Christian era, it remained for Louis of Paris in 1825 to suggest first that the majority of the chronic forms of peritonitis were of a tuberculous nature. Spencer Wells in 1862 when operating upon a supposed case of ovarian cyst found to his surprise a large quantity of free fluid, and peritoneum covered with numerous warty growths. To his astonishment the woman recovered, and remained well. It was not, however, until 1884 that the condition was properly appreciated. In that year Koenig not only discriminated between tuberculous ascites and that due to other causes, but showed that tuberculous peritonitis with free fluid may be either general or localized, and that, without any other evident tuberculous focus in the body. Finally, he recommended that it be dealt with by surgical means.

There are three possible ways in which the peritoneum may be invaded by the tubercle bacillus; by the lymphatics; by the blood stream, or by direct extension from a contiguous focus. While it is obviously impossible in many cases to exclude the possibility of a blood infection, the lymphatic route is the source in the great majority of instances. In the first place there are undoubted cases of primary peritoneal tuberculosis. In 92 autopsies on patients dying of tuberculous peritonitis Cummings reports three in which no other lesion was found, while Borschke in 226 autopsies found the peritoneum to be alone involved in two: while Osler reports 5 cases as primary and 17 local in autopsies of his own. In 60 cases reported by Colman from the Children's Hospital, Great Ormond St., there were 9 in which the peritonitis was confined to the diaphragm and anterior wall, and in only 2 of these were there lesions in the mesenteric glands or intestinal mucosa, while in all there were caseous thoracic glands, and pulmonary tuberculosis. While again in 100 autopsies carefully conducted by Raw on children dying of tuberculosis, many of them ordinary cases of phthisis, 23 had caseating mesenteric lymph glands without any ulceration of the intestine. Obviously then, the tubercle bacillus can pass through the intestinal mucosa without leaving any trace behind, and set up an inflammatory process in the lymph glands or peritoneum, and experimental evidence proves this assumption to be true. Autopsy findings show the lungs to be involved in about 90% of cases, and the intestinal mucosa in percentages varying from 75 to 32, but these represent the terminal stage of the disease, and do not present a correct view of the situation as seen when the patient first comes under observation. And if about 3% are primary at autopsy, how much greater must the percentage be when abdominal distress causes the patient to seek medical advice.

When the disease spreads from a contiguous focus it is usually the Fallopian tubes which are held responsible, and Murphy maintained that in the female the majority of cases of tuberculous peritonitis were tubal in origin. It is extremely doubtful, however, if this is so, and indeed the evidence points to quite another conclusion. In the period from 1905 to 1920 there were 116 patients treated for tuberculous peritonitis in the surgical wards of the Toronto General Hospital. Of this number 79 were females, and 37 males. There were 98 operations, 68 being upon females, and 30 upon males. In only 11 instances were the tubes found enlarged at operation, or a little over 15%. There is evidence too that in many instances the tubal involvement is secondary to the peritoneal disease, for experiment has demonstrated a peritoneal current flowing in the direction of the Fallopian tubes. In this connection the observations of Barbour and Watson are interesting. In a study of tuberculosis of the Fallopian tube they found that the initial lesion was in the epithelial cells of the mucosa, and near the fimbriated extremity. In the earliest stage there was heaping up of the epithelium, and later destruction. The changes in the

muscularis they considered to be secondary to the epithelial involvement. From this study they were of the opinion that the disease was not blood borne, but that the bacilli gained access through the surface epithelium. There is an analogy too in the occurrence of carcinoma of the ovary secondary to a growth in the breast, whereby the epithelial cells reaching the peritoneal cavity migrate to the pelvis, and become engrafted on an ovary.

Tuberculous peritonitis occurs in three forms: the ascitic, the adhesive, and the caseous, although it must be understood that in many cases there is no sharp line of division between them. The ascitic is the most common. In most cases the peritoneal cavity contains a considerable quantity of clear straw coloured fluid containing a variable number of lymphocytes and a few tubercle bacilli, but it may be greensih yellow in colour or blood-stained, and at times turbid or purulent. The quantity is variable, but is never so great as ascites from portal obstruction. The peritoneal surfaces are hyperæmic, and thickly studded with tubercles of varying size, the smaller ones grayish and translucent, while the larger, and older ones are caseous. On the intestine is frequently seen a fibrinous exudate, and at times the exudate contains numerous small flakes. If seen early there will probably be no adhesions found, but it is not uncommon to find a few present. In a later stage not only are the intestines adherent to one another, but also to other intra-abdominal structures. The omentum becomes converted into a hard dense mass lying transversely in the upper part of the abdomen, while the mesentery may so contract as to fix the intestines en bloc to the posterior abdominal wall. Portions of the peritoneal cavity may in this way be shut off, and localized collections of fluid, ascitic or purulent, result. The caseous variety is an exaggeration of the adhesive. Tuberculous areas of some size appear between the intestinal coils, or in connection with the mesenteric glands, caseation ensues, followed in many instances by secondary infection and abscess formation with fistulae between adjacent coils or upon the surface usually in the neighbourhood of the umbilicus. Very often the adhesive is a late stage of the ascitic, but it may develop subacutely without obvious fluid exudate. In this series 67 were ascitic, 47 adhesive, and 2 caseous, although in 8 of the adhesive there were caseous nodules.

Age is an important factor in the incidence of tuberculous peritonitis. It may be congenital and there is one case reported where a three days old baby was seized with vomiting, and died on the sixth day, and the autopsy showed advanced tuberculous peritonitis with intestinal obstruction. On the other hand Osler refers to a case in a man 82 years old. Out of 220 cases reported from the Massachusetts General Hospital, 178 occurred before the thirtieth year, and between 20 and 30 there were 89, which decade showed the largest number of cases. Osler's collection from the literature likewise showed the largest number occurring in the third decade. In the present series there were between the ages 10 and 20 thirty-three cases; between 20 and 30 forty; between 30 and 40 twenty-five; between 40 and 50 twelve; between 50 and 60 five, and between 60 and 70 one. Here, too, the third decade accounts for the largest number. The youngest was eleven years of age, and the oldest sixty-four. Eighty-four per cent. of the cases occurred between the tenth and fortieth year. At the Massachusetts' General Hospital as high as 80% of the cases occurred before the thirtieth year, but when the 49 cases in children under ten are deducted the proportions are very similar. Jacobson, after reviewing the statistics of various countries concludes that the disease occurs most frequently between the twentieth and fortieth years. There is one striking series of cases at variance with these conclusions, however, for in 164 personal cases reported by Nothnagel 60% were over thirty years of age and the fourth decade supplied the greatest number.

The relation of sex to tuberculous peritonitis is interesting. In Osler's series 70% were males, but in his collected statistics there were twice as many females as males. W. J. Mayo found it four times more frequent in the female. Shattuck in 98 cases found 67 to be men and 31 women. Stone in 122 cases had 62 males and 60 females. In Nothnagel's series just referred to there were 101 men and 63 women. In this series as already noted there were 79 women, 37 men, or roughly a proportion of two to one, which agrees with Osler's collected statistics.

But if the records from the postmortem room are taken a very different conclusion is arrived at. Bircher collected 452 autopsy records of individuals dying of tuberculous peritonitis; 74% were males and 26% females. Taking the average of three other series the ratio of three

males to one female at the autopsy seems to be fairly accurate. Had autopsies been performed on all those who died in this series the proportion would have been two and a half to one. On the other hand the death statistics from England show approximately the same percentage in the sexes namely 0.16%.

A history of tuberculosis in the family is of great importance. A positive finding is present in from 20 to 40% of the cases. In this series there was a positive hereditary history in 24%. Previous illnesses frequently have an important bearing, especially pleurisy, which was present in 14 or 12 per cent. in this series. In only one instance, however, was the operative finding suggestive of the tuberculous process in the peritoneum having spread from the pleura. In one instance it started as an ischiorectal abcess with fistula eight weeks previously, in another there was an old tuberculous hip, with considerable shortening, and a third had a tuberculous spine. Occasionally traumatism appears to have a direct aetiological bearing. One woman age 50 in this series was knocked down by a bicycle and symptoms developed rapidly from that date, and death occurred in six weeks. Jacobsom of Syracuse reports a similar case. Where traumatism is a factor the case is likely to be an acute one. Childbirth is given as an aetiological factor by some writers. It was noted in only two cases in this series.

The symptoms manifested by tuberculous peritonitis are of extreme diversity. In the first place it may be latent and not cause a single symptom, being discovered accidentally in an operation for hernia, or it may be so sudden as to come under the category of an acute abdominal disease. Most writers agree in considering the majority of cases as gradual in onset. Jacobson, however, quotes with approval the statement of Lauper of Kocher's clinic, that all cases of tuberculous peritonitis have a prodromal period of several months, and at the conclusion of this period nearly all have a sudden outbreak of acute manifestations. During this prodormal stage the patients suffer from gradual loss of appetite, languor, malaise, and vague abdominal complaints with irregular action of the bowels. In this series 84% had prodromal symptoms, and of these 20% after a shorter or longer period had an acute attack. In 16% the onset was sudden without any previous period of ill-health. In one instance the attack came on after a game of ball, the boy having sat down on the damp grass at the end of the game. In another instance the acute attack seemed to have been precipitated by a lobster luncheon, while in another a man was taken suddenly ill on the street with pain and vomiting after having paid a visit to a sick friend.

The most common symptom is pain in some portion of the abdomen, the character depending upon whether the condition is acute or chronic. Frequently the pain radiates to the back, and in a few instances down the thigh. When localized it is more frequent in the lower than in the upper abdomen. It was present in over ninety per cent. of the cases. As a rule tenderness is present, and it may be general or local.

The behaviour of the temperature is a valuable sign, and in 14 instances in this series there was no rise above normal, while in a few it was markedly subnormal. In one of the fatal cases the temperature was subnormal throughout. In the severe cases it is unusually high. Secondary infection of caseous areas will cause the patient to run a high fever.

While the majority of the patients have lost weight, some are well nourished, and in two instances the women are described as fat. Disturbances in urination are frequent. In some there is frequency, while in others there is pain. Jacobson says that these symptoms are present in about one half the cases, but they were noted in but 12 instances in this series, and in three of these the disturbance lasted but a few days, one having had difficulty in starting the stream. Vomiting was a prominent symptom in 22 cases. Marked constipation in 5, and diarrhoea in 10. In only three was there microscopic evidence of blood in the stools. A few had alternating constipation and diarrhoea. Loss of weight was a pronounced symptom in 29 cases. Four complained bitterly of headache, and one of nosebleed. Night sweats were severe in 7 instances, and one of nosebleed. Night sweats were severe in 7 instances, and chills in 6. Dyspnoea was troublesome in but 5 instances. Menstrual disturbances are noted in 11 cases.

The leucocytes varied from 3,400 to 19,800. In 60% the count was 10,000 or less. Stone from his series concluded that a high leucocyte count associated with tuberculous peritonitis indicates the presence of sepsis in some form, and that in non septic cases the tuberculous process is attended with a low count. There is doubtless a great deal of truth in this statement, but on the other hand it must not be

assumed that because there is a normal count the patient is in no particular danger, for in 4 of the fatal cases the count was less than 9,000 in each of them.

The most common local manifestation is an increase in the size of the abdomen. Usually ascites is the cause for this condition but it may be due to gaseous distention and in the adhesive variety tympanites is the usual cause. Tumour formation may be due to several local changes. The commonest is that due to a deformed omentum which becomes puckered and rolled into an firm elongated mass usually lying transversely in the upper part of the abdomen. It was noted in 16 instances in this series. Rarely a local tumour is due to coils of intestine firmly matted together and of this there was one example in the series. Sacculated collections of fluid caused by adhesions either between several coils themselves or with the mesentery or abdominal wall as one of the boundaries account for a small precentage of local swellings. There were three in the series, one in the upper abdomen, one in the pelvis, and one below the umbilicus. Enlarged mesenteric glands with secondary changes are occasionally responsible for tumour; especially in children is this the case.

When the distension is considerable the skin will be found thin and shiny. In one case it was pigmented. In three instances there was considerable swelling of the lower extremities.

The diagnosis of tuberculous peritonitis is not always easy, and may be extremely difficult. Both the family and previous history should be gone into most carefully. The lungs must be examined for old or active lesions, and stereoscopic plates made. In the female patients a careful pelvic examination should be made, and any abnormality of the tubes noted. Where the fluid is free in the peritoneal cavity the condition must be diagnosed from other causes of ascites. These are—(1) General, as in cardiac or renal disease, but in such conditions the ascites is part of the general dropsy and should give rise to no difficulty in diagnosis even where the tuberculous peritonitis is complicated by oedema of the legs as occasionally happens; or (2) Local and in this connection one must rule out particularly ovarian cyst. This is in many instances difficult even without encapsulation as is attested by the many operations for supposed cysts. The Ascites due to portal cirrhosis or to pressure from any cause upon the portal vein must be differentiated from as must also be malignant peritonitis and Banti's disease in the late stage. Cirrhosis should be ruled out without much difficulty, but it should be borne in mind that tuberculous peritonitis is a frequent complication in a terminal cirrhosis. Cases with a rolled up omentum are hard to differentiate from a similar condition in carcinoma. Even with the abdomen opened it is impossible at times to tell whether one is dealing with a tuberculous peritonitis or with a malignancy, so that reliance must be placed upon the histological picture. Cases with gradual onset, a low type of fever and tympanites with vague abdominal pains are apt to be mistaken for typhoid, but a blood test and culture should readily differentiate between them.

The complications of tuberculous peritonitis are chiefly fistulous formations, and acute or chronic obstruction and jaundice. The fistulae may form between adjacent coils of intestine or into the vagina or on the surface of the abdomen when they most frequently appear in the neighborhood of the umbilicus. They result from secondary infection of caseous masses, and are invariably of very serious import. How frequent are the internal fistulae is obviously difficult and in many instances impossible to determine, for even at the necropsy it is hard to be certain whether or not the hole in the bowel was produced by separating adhesions. In this series there were two instances of external fistulae, and both died in hospital. One patient was operated on for acute obstruction which was caused by a band, while in two instances there was chronic obstruction. In one of the latter the sigmoid was so compressed that the barium enema failed to pass, and at the operation the diagnosis of malignant disease was made, and a piece of tissue removed for section. The patient had only been ill for two weeks. There was no instance of jaundice in the series, but on account of its rarity, I may be pardoned for taking this opportunity of reporting a case I had in the army.

Mr. G., age 27. Reported sick May 2nd, 1917, complaining of pains in the right shoulder and stomach, nausea, with weakness and diarrhoea. About three weeks later jaundice appeared, but without any severe pain. He had typhoid three years previously, and was in bed eight to ten weeks. Examination on May 24th showed the patient well nourished, but deeply jaundiced. There was slight elevation of temperature, and no acceleration of pulse. The

liver was two fingers' breadth below the costal margin, and there was no evidence of fluid in the abdomen. On August 1st I saw him again. The jaundice at this time was intense. He had lost a little weight, but was still well nourished. The liver was down a hand's breadth with a thick hard edge. A large mass six inches long and an inch and a half in diameter lay in the location of the descending colon. Other masses were apparent two inches to the right and below the umbilicus. Rectal examination was negative, as were the Wassermann and tuberculin tests. Lactic acid was present in the stomach. Clinically the chest was negative. On August 7th the abdomen was explored through a right rectus incision above the umbilicus. Adhesions were everywhere present, but no fluid. The stomach was fixed to the under surface of the liver in a hard dense mass. The gall-bladder was likewise embedded in a hard mass, and discernible with the greatest difficulty. The bile ducts could not be examined, so dense were the tissues about. Masses were felt in various parts of the abdomen. There were some yellowish nodules about the size of beans on the parietal peritoneum, with a distinct bile stain, but nothing on the visceral layer in the vicinity of the wound. One of these nodules felt calcareous. The liver was very firm and fibrous, but presented no nodules. A diagnosis of malignancy was made. The man died 48 hours later. On opening the abdomen there was considerable haemorrhage in the peritoneal cavity. The stomach was found to be inextricably bound to the liver, and the bile ducts could not be dissected out without a great deal of tearing. There was a hard yellowish mass to the right side of the gall-bladder, which latter although embedded, did not appear to be much thickened. The common bile duct was normal in size.

The pancreas was considerably enlarged and very firm. The pylorous was fully three inches to the right of its usual position, and the duodenum densely bound down. The large mass in the left side was the omentum, in the midst of which was a large caseous mass. There were large masses behind the umbilicus. On the sigmoid were some typical gray tubercles. As only a limited autopsy was permitted, no other cavity was examined. Histological study demonstrated the condition to be tuberculous peritonitis.

The prognosis in tuberculous peritonitis depends upon several conditions. If there is elsewhere an evident focus in an active condition the outlook is worse. Rapid wasting is obviously of serious import, and the presence of diarrhoea means ulceration of the intestinal mucosa and a bad prognosis. Persistent high fever is a bad sign, but a subnormal temperature is frequently seen in cases that are going rapidly down hill. Faecal fistula, whether spontaneous or the result of breaking down of adhesions is nearly always fatal. The prognosis is best in the ascitic form, and worst in the adhesive complicated by one or more purulent foci.

The surgical treatment of tuberculous peritonitis dates from the time when Spencer Wells opened the abdomen for a supposed ovarian cyst, and his patient after a stormy convalescence recovered and remained well. König as early as 1890 reported 131 cases, 14 being his own, with recovery in 84, or approximately 64%, and gave a great impetus to the operative treatment. Since that time there have been numerous operative procedures adopted, but for the most part they have been discarded in favour of a simple laparotomy with a search when possible for any intra-abdominal focus, and its removal where such is feasible. Although the theories advanced are numerous enough, how opening the abdomen and allowing the fluid to escape cures the condition is not known, and I shall not take time to discuss them. Neither shall I say anything about the medical treatment further than that it should always be tried for six weeks; then if no improvement ensues operation should be performed, provided the condition is of the ascitic variety or again operation is indicated in the adhesive type if there is evidence of a local focus as for example a tubal mass or where there is an abscess in an accessible position.

About the year 1905, owing to the large number of recurrences after operation the question was extensively discussed as to whether medical or surgical treatment gave the best results. Numerous statistics were quoted on each side. Of 21 cases which Ochsner was able to follow 15 were well from 1–11 years after operation and 5 had died; of Rorsch's collected series of 358 cases the immediate recovery was in 253 or 71%. The operative mortality was 5.6% and there were 14.8% cures after 2-3 years. Against this, however, the combined statistics of Borchgrevink and Sutherland show 82% of cures by medical means as against 58% when a laparotomy was done. Munro gives 30-40% cures after 1-2 years in cases that had resisted medical

treatment. Fenger quotes the operative mortality as 1-2%. Hall reports 94 immediate cures in 110 operative cases or 85%. Thomas gives 73%, while Walter says 50% of ascitic cases are cured by opening the abdomen. Shattuck found that the ultimate result in cases treated surgically was a mortality of 37.5%, while the medical death rate was 68%, but admits that in the medical series other tuberculous foci co-existed.

W. J. Mayo is a strong advocate of more radical measures in treatment. He found some of his cases coming back as many as four or five times, and these were cured after removal of the tubes. In 26 instances he found the peritonitis greatest near the tubes. Carstens of Detroit has recently emphasized the desirability of leaving the tubes alone unless definitely diseased, as the outcome is quite as favourable as after removal. Certainly if there are extensive adhesions, no attempt should be made to break them down to remove a doubtful focus, as more harm than good will likely result. Faecal fistulae are very easily produced, as for example the recorded case of König's due to merely rubbing iodoform into an infected area. Re-accumulation of the ascites is not a contra-indication to another operation, and many cases recover after repeated laparotomies.

In this series there were 98 operations, 68 of which were on women, and 30 on men. There were 14 deaths, 10 of which were males, and 4 females. Only in 5 instances did death occur sufficiently soon after operation to be attributed to it, making an operative mortality of 5.1%. The youngest was a boy of 16, and the oldest a man of 48. The average age was 38. In 11 instances the tubes were considered pathological, while in 12 cases the appendix was removed. In only two of the appendices, however, was there enough acute inflammation and enlargement to make the operator think they might be the primary focus. In 14 instances the operation wound became infected with tubercle and a sinus persisted for various periods and in some the patient had a second and third operation for its cure, but without any benefit.

In endeavouring to find out whether or not a patient was improved after an operation I have been guided to a great extent by the temperature and pulse rate, and whether or not there was less pain and discomfort or whether the fluid began to return, rather than the statement of the houseman who wrote the notes, for in several instances where improvement was noted, I could not satisfy myself that such was the case. Out of the 98 operative cases then, improvement on leaving the hospital was present in 40, or about 40%. Adding 6 doubtful cases that were operated upon to the 4 non operated improved cases, we find that 50 out of the 116 in the series may be regarded as immediate cures, or a percentage of 44.6. What percentage were permanent cures is not known.

A METHOD OF PREVENTING THE ABSORPTION OF INTESTINAL TOXINS

"Keep the colon toxins from being absorbed by the body," is the urgent appeal of the modern authority. This is almost tantamount to saying: "Keep the mucous membrane of the colon intact," for it is through abrasions in this membrane, hindering the outflow of mucous into the colon, that the absorption of toxins from the fecal matter takes place.

To overcome such a condition, Nujol is freely used by the profession. It retards the absorption of poisons by preventing their contact with the living tissues. It also exerts a lubricating power, softening the stools to permit easy and frequent evacuation. In addition to this, an important function of Nujol is the absorption of toxins, retaining them in the fecal mass until expelled.

Nujol is readily accepted by the most "finicky" patient, because it is absolutely tasteless, odorless and of a crystal clearness.

INTESTINAL TUBERCULOUS INFECTION IN CHILDREN

H. H. PITTS

(From the Pathological Laboratories of the Royal Victoria Hospital and of McGill University, Professor Oertel, Montreal)

THE paths of tuberculous infection and invasion are still in dispute and in the majority of cases of advanced, generalized tuberculosis almost impossible to determine. Recently the possibility of primary tuberculous intestinal infection has, especially in children, been gaining ground and it is now held with some justification that even pulmonary, or the so-called aerogenous or inhalation type may be traced to an original gut invasion.

The two cases which are herewith reported have an especial interest in this connection. They are both examples of generalized tuberculosis—one a miliary tuberculosis, the other a tuberculous meningitis—in which only a limited strictly localized, more or less quiescent, tuberculosis of the gut, in an unusual situation, appeared as primary lesion. Remarkable is further that no tuberculosis existed anatomically elsewhere, with the exception of the mesenteric glands, which were, it appears, infected from the gut. Important was the entire lack of tuberculous foci in lungs or even in the peri-bronchial glands. The small intestinal lesions, which in a cursory examination could have been easily overlooked, had led to a considerable involvement of the mesenteric glands alone from which generalization then occurred:

Case 1. Female, age 11 years, admitted December 3rd, 1920, unconscious. Sudden onset 3 days previous, characterized by anorexia, weakness, constipation and slight "cold." She vomited during the first three days of illness. Headache slight but generalized since November 30th. Irritability and insomnia.

December 1st. Irrational. December 2nd. Hemiplegia and ptosis left eyelid.

St. Pr. Patient unconscious, right hemiplegia; pupils widely dilated, head turned to right; neck stiff. Vocal fremitus increased over whole chest. Percussion note slightly impaired in right upper lobe. Numerous moist rales. W.B.C. 10,000. Spinal fluid under pressure. Globulin +++ .40 lymphocytes per cmm Patient died December 3rd.

Autopsy, 175-20, revealed a fairly generalized recent miliary tuberculosis and tuberculous meningitis. The lungs showed no evidence whatever of any old tuberculous focus from which miliary infection could have occurred, but only recent miliary tubercles. Moreover the bronchial and peribronchial lymph glands were quite free from any evidences of tuberculosis.

In the lower part of the jejunum, in an area covered by only a few inches, along the mesenteric attachment are found, firmly embedded, a number of strictly limited, large pin-head sized, firm tubercles in and below the mucosa and in the mesentery. Those in the mucosa have not led to any ulceration and the mucous membrane itself appears intact above the tubercles. The rest of the gut is clear and clean throughout.

The mesenteric, perigastric and pancreatic lymph glands were enlarged and showed small yellowish tuberculous nodules.

Microscopic sections from an involved portion of the jejunum show throughout intact and well preserved mucosa with healthy glands. In one area of mucosa a minute tubercle, made up of necrotic but not cheesy epithelioid cells is to be seen, surrounded by lymphoid cells, immediately below intact glandular acini. It appears strictly limited, not spreading and is apparently quiescent. In the submucosa and extending to the muscularis a large cheesy but also well circumscribed tubercle may be seen. Extensions are not visible and the surrounding parts of the gut appear quite healthy.

Sections through the mesenteric lymph glands show typical tuberculous lesions.

Case 2. Male, age 2 years. Admitted November 8th, 1920, semi-conscious.

Course.—Became very irritable since October 18th. Some fever and headache. Profound constipation and malaise, listlessness. Vomiting. Internal strabismus, stiffness of neck, stiff, rest-

less movements of extremities. Clinical diagnosis: Tuberculous Meningitis. Died November 10th, 1920.

Autopsy, 168-20, revealed a thick gelatinous exudate over base of brain and many small pinpoint tubercules following the branches of the middle cerebral arteries. Increase of fluid in lateral ventricles.

In the lower part of the jejunum a small superficial ulcer, 3 x 2 mms., may be noted at the mesenteric border, at one end of which is a tubercle the size of a large pinhead. The mesenteric glands vary in size from a pea to a large marble and many are caseous, but there are no evidences of tuberculosis elsewhere. Microscopic sections through the meninges showed typical tubercules. Microscopic sections through the involved portion of the gut show a number of typical, partly cheesy, larger tubercles with a tendency towards confluence. These occupy the whole of the submucosa and extend to the muscularis. Stretches of mucous membrane above these tubercles have collapsed and are partly necrotic, although glandular acini and their supporting structures are still visible. In neighbouring parts ulceration is further advanced and leads to necrotic loss and granulomatous inflammation of mucosa and submucosa.

The lungs, peri-bronchial, and bronchial lymph glands as well as other organs were uninvolved and showed no tuberculous lesions.

These two cases point clearly to an intestinal path of infection and are also remarkable in the finding that the mesenteric glands were the only group of glands which were visibly affected. This is so much more noteworthy when it is realized that tuberculosis of bronchial glands is the most common type of early and quiescent tuberculosis in infants and in children.

Both cases conform with the common experience that the most frequent generalizations of tuberculosis in infants and children are miliary tuberculosis and tuberculous meningitis, and that pulmonary tuberculosis does not become manifest until after the *tenth* year. (Hamburger, Tuberkulose d. Kindersalters, 1912.)

Of interest and importance also is the situation of the tubercles in the gut. The invasion and primary lesion in these cases did not occur where they are most generally expected and where the gut is richest in lymphoid tissue, i.e., lower part of ileum, but both were in the lower part of the jejunum and of very limited and circumscribed character. It is also interesting to note that in the first case epithelial and glandular lining of the gut were intact, making it appear that bacilli passed into the mucosa without superficial injury.

These two cases lend, therefore, in their clear cut character an almost experimental evidence that, at least in children, the higher portions of the gut may be the port of entrance for tubercle bacilli and that the original focus may be a strictly localized tuberculous lesion in this situation. From this point, however, secondary extension to, and greater involvement of mesenteric glands may occur with final generalization and anchorage in those organs which, by virtue of predisposition of age period, are particularly liable to tuberculous disease.

The cases also emphasize the care with which the gut must be inspected even in unsuspected places before the presence of tuberculosis of the intestines is definitely excluded. In this connection it may be of interest to record that in a case recently observed in these laboratories, in which the appendix had been removed by operation from an adult male, 30 years of age, for what clinically and anatomically appeared to be a non-specific exudative and productive appendicitis and peri-appendicitis with a peri-appendicular abcess, small, localized, apparently quiescent tubercles, composed of epithelioid and giant cells without caseation or any tissue reaction around them, were later discovered in otherwise well-preserved lymphoid follicles of certain parts of mucosa and submucosa. The acinar elements and lining of the mucous membrane continued here also intact over them. Nothing in the patient's history had pointed to tuberculosis anywhere. Recovery was uneventful and the patient was discharged cured 12 days after operation.

A CASE OF WOODY THYROIDITIS

DANIEL NICHOLSON, M.D., C.M.,

Lecturer in Pathology, University of Manitoba,
Assistant in Pathology, Winnipeg General Hospital.

THE patient was a married woman 38 years of age. She had a family and had never suffered from any illness which could be connected with her present trouble. No family history of tuberculosis could be obtained.

Last August, at the end of her menstrual period, a swelling appeared in the right thyroid lobe which was very painful, tender, hard and fixed. So painful indeed was it that the patient said it felt like a boil. About a week later the left lobe became similarly involved. By this time she was very ill and suffered from severe headaches, chills, night sweats and loss of appetite. A physician was called and he diagnosed her condition as an acute toxic goitre. Her pulse was 160 per minute. She was ordered to bed for absolute rest. Three weeks later Dr. Onhauser saw her. Her condition was still worse. Her temperature ranged from 100 to 103 and her pulse went up to 170 at times. None of the classical eye symptoms of Grave's disease were present but there were very fine digital tremors. The tumour was bilateral, each lobe being about the size of a hen's egg, very hard and easily defined. She was now taken into the hospital. After a week of absolute rest she felt better. Her pulse was 100 to 140 and her temperature had dropped to normal. A diagnosis of carcinoma of the thyroid was made on account of the extreme hardness of the mass. Dr. Brandson operated on her, removing both lobes and leaving a small mass of what appeared to be normal thyroid tissue at one lower pole.

Her recovery was uneventful and after 8 days she left the hospital. Two months later her pulse had fallen to 72, her temperature was normal and she felt well. The scar was barely noticeable. She had gained 20 pounds, felt in good health and was able to do her own housework.

PATHOLOGY.

Gross Appearance.—The mass of thyroid tissue which was removed was quite unlike any thyroid I have ever seen. Each lobe was about the size of a small hen's egg, of regular outline, oval and slightly flattened. It had an opaque, dead white colour, and the term "Woody" or "Iron-Hard" very well described its characteristic hardness which at first sight led us to believe that it had been preserved in pure formalin. Scattered over the cut surface were numerous small cysts separated by dense strands of connective tissue with here and there patches of a yellowish colour.

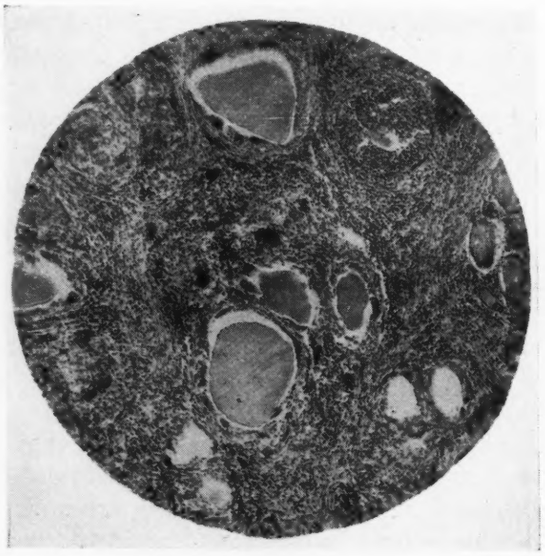

Fig. 1. Frozen section, thaematoxylin and sosin stain. X 100 Diameters. Section shows open spaces partly filled with colloid material. The connective tissue proliferation is very marked. Several giant cells and areas of round cell infiltration are seen.

Microscopic Appearance.—A microscopic section showed no resemblance to ordinary thyroid. Only a few colloid spaces remained, the others being choked out by the overgrowth of capsular and interstitial connective tissue. There were

no areas of caseation but here and there masses of round cells were seen and the nearby fibroblasts had plumper nuclei with less cytoplasm. Definite typical giant cells were seen at intervals throughout the section. From this pathological examination the condition seemed to be of longer standing than the symptoms would suggest. The extreme hardness of the thyroid mass, the very marked fibrosis and the presence of occasional giant cells led to a diagnosis of "Woody" or "Iron-Hard" Thyroiditis described by the German writers. *See Fig. 1.*

Woody thyroiditis is generally though not always of tuberculous origin. In acute miliary tuberculosis the thyroid is often involved, but this is of no surgical interest, as the thyroid involvement is but a part of a very widely disseminated fatal infection. Tuberculosis may attack the thyroid acutely, thus causing the patient to suffer from acute thyrotoxic symptoms, or the tuberculous process may be of a chronic character and produce as a result this condition of woody thyroiditis. Plummer and Broders[1] of the Mayo Clinic report seven cases of tuberculosis of the thyroid which they divide into three groups. First group, two cases, showed a very marked hyperthyroidism; with early tuberculous changes found on pathological examination. Second group, one case, showed a less pronounced hyperthyroidism and a slight fibrosis of the thyroid. Third group, four cases showed little or no hyperthyroidism and a very marked tuberculous fibrosis. M. Couloud[2] described 120 cases of tuberculosis of the thyroid in which 86 showed fibrosis varying from moderate to very marked. The third group described by Plummer and Broders and the 86 by Couloud would correspond to woody thyroiditis. There are pathological conditions of similar harness to this condition in other glandular organs but of non-tuberculous origin. Such are the Riedel pancreas, the Mikulicz submaxillary fibrosis, the Küttner lachrymal gland.

Woody thyroiditis is generally confounded with carcinoma. It is very important to differentiate them because while in carcinoma the prognosis is bad, it is extremely good in woody thyroiditis. They have many points in common. Both are hard, rapidly growing tumours, but other features help to differentiate them. Carcinoma generally occurs in females, woody thyroiditis more frequently in males. In carcinoma the growth is very nodular and large, in woody thyroiditis it is of medium size and smooth. Carcinoma occurs more frequently in those who have previously had a goitre, especially if they have had an operation, while woody thyroiditis occurs often in patients affected with pulmonary tuberculosis.

In conclusion, when a physician is consulted by a young or middle aged patient with a hard, smooth, painful swelling of the thyroid with or without thyrotoxic symptoms, I would suggest that woody thyroiditis be considered in the differential diagnosis.

I wish to express my indebtedness to Dr. Onhauser of Minnedosa for the history of this case, and to Dr. Brandson for the pathological specimen.

1. Plummer and Broders, "Tuberculosis of the Thyroid", *Minnesota Medicine,* May, 1920.

2. M. Couloud. "Le corps thyroide des tuberculeux." *Bull. et Mém. de la Soc., Méd. des Hôp. de Paris.* Dec. 23, 1920.

COMMENTS ON BROMURAL

The sedative action of bromine, while unquestioned, is seriously militated against by certain collateral effects when given in the form of its inorganic alkaline salts, the bromides. They do not carry the halogen well. Such derivatives as Bromural are advisedly to be used in their stead, affording as they do the straight hypnotic and sedative effects wanted.

Bromural is one of the best of these organic bromine compounds and appears to be very satisfactory in cases of nervous insomnia and general nervousness. It is said to produce sleep without markedly affecting the circulation or respiration. In nervous and hysteric cases, especially affecting women, it brings calm and rest. But like other hypnotics it may fail where there is pain or cough; these symptoms must be subdued by other measures or adjuncts. The dose is five to ten grains. The advantage is claimed for it that, while quickly and decisively impressing the central nervous system, it does not stupify to the degree that other agents of this class are wont to do, nor leave that feeling of heaviness which after some hypnotics is quite distressing.—*Am. Journal Clinical Medicine,* May, 1921.

BLOOD TRANSFUSION IN SEVERE BURNS IN INFANTS AND YOUNG CHILDREN

A Preliminary Report of the Treatment of the Toxic Shock by Blood Transfusion—with or without preceding exsanguination.†

BRUCE ROBERTSON, B.A., M.B. (TORONTO), F.A.C.S.

Associate Surgeon, Hospital for Sick Children, Toronto, Canada

A review of a hundred consecutive cases of burns and scalds admitted to the wards of the Hospital for Sick Children within the first 24 hours of injury, shows that the greatest number (74%) of severe burns is encountered in children of 4 years and under. An analysis of these cases reveals a startling mortality, not so much from the primary shock, but from the secondary toxic shock, and particularly in those cases of 2 years and under.

		0–2 yrs.	2-4 yrs.	4-8 yrs.	8–12 yrs.
Recovered		16	31	11	7
*Died	Primary shock	5	3	4	1
	Toxic shock	8	8	2	1
		29	42	17	9

TOTAL 100 cases.

Only the cases of burns and scalds severe enough to demand hospital treatment are considered. The slighter cases treated in the out-patient department are not discussed.

The main problems encountered early in severe burns in infants and young children are (a) primary shock, (b) toxic shock.

Primary Shock:—Where the primary shock is so intense that death may occur a few hours after the injury, treatment directed towards relief of the shock is very disappointing and the burn is usually so severe and extensive as to preclude the possibility of recovery either in the immediate or remote future.

Toxic Shock:—In a certain number of cases, the primary shock merges indefinably into the toxic shock, so that no stage of recovery from the former is apparent. This condition renders the success of any form of treatment very doubtful.

There is, however, a type of case in which the primary shock is mild or absent and the burned area though fairly extensive, not deep, but in which fatal result is the rule. Unfortunately, we are all too familiar with the case of the burned child, in which at first the general condition is good, brought in an hour or so after injury showing *e.g.* a fairly extensive 2nd and 3rd degree burn† of trunk or extremities. On admission, the general condition seems to be better than the extent of the burn might warrant, but in the course of 24 hours or so, the temperature rises, and a convulsion occurs. Cases of this type usually die in 36-60 hours after one or more convulsions, with temperature often as high as 107°. (See Fig. 1.) In older children one may see only cyanosis of the extremities and the signs of circulatory collapse before death.

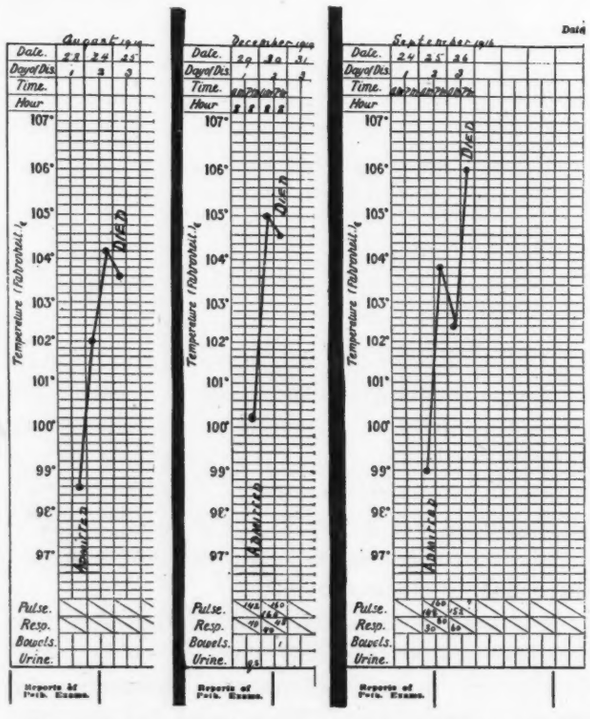

Fig. 1. Three typical charts of cases of superficial burns dying of toxic shock and not treated by transfusion.

*Three other cases between 2-4 years died of bronchopneumonia, infection of burned area, and intestinal haemorrhage, respectively.

†Cases 1-6 reported before combined sections of Surgery and Pathology Academy of Medicine, Toronto, March 15th, 1921.

In a recent investigation of the pathology in 10 cases of superficial burns, Weiskotten[1] (see reference) found characteristic lesions in suprarenals, lymphatic tissues and heart muscle "indicating the presence in this class of cases of a more or less specific poison in the circulating blood." These changes commenced a few hours after the injury was sustained and were progressive for not more than three days. In the lymph nodes, at least, retrogression of the lesions began at the end of three days.

It would appear probable then, that there is a toxin produced in the burned tissue and that it is thrown into the blood stream,—that its action diminishes after about three days, either through diminished production, or as a result of the resistance of the body tissues (neutralization or elimination), and it is a significant fact that those cases noted in our statistics as dying of toxic shock practically all succumbed within 60 hours of the receipt of the burn. Clinically, it would seem that the toxin is gradually liberated from the damaged tissue and taken up by the blood, until, in the fatal cases, a cumulative effect is produced on the central nervous system: the temperature rises, and convulsions are precipitated. In the non-fatal cases the absorption of toxin is indicated by a rise in temperature and drowsiness: there are no convulsions, and the toxin is eventually neutralized or eliminated.

It is in the period of toxic shock, before the nervous system has been overwhelmed by the toxin, that treatment directed towards the neutralization or elimination of toxin should be established. Various procedures have been tried, such as the intravenous and subcutaneous administration of saline and of glucose solutions, with the idea of diluting the toxin, and of hastening its elimination, but in the more severe cases, these measures have fallen short of the objective point.

In the hope of overcoming the effects of a circulating toxin, the treatment by blood-transfusion, or the more radical procedure of "exsanguination-transfusion" was carried out in this Hospital. The seven following cases serve as a basis for this report. It will be noted that pneumonia—a not infrequent complication of burns—occurred in two of the cases. In one, which recovered, it followed a chest-wall burn, and in the other it was caused apparently by inhalation of fumes, and resulted fatally.

The technique of "exsanguination-transfusion" is briefly as follows:—

After preparation for the transfusion, blood is withdrawn from the patient until there are beginning signs of blood loss. Where the anterior fontanelle is open, blood may be withdrawn from the longitudinal sinus. In older children, we have used the external jugular, the femoral vein (a cannula being introduced through the proximal part of the saphenous vein) or the radial artery. (It is impossible to obtain any considerable quantity of blood from the superficial veins of the extremities in a child under 5 years of age, particularly if the circulation is sluggish.) The transfusion is then commenced, the donor's blood being introduced by the great saphenous vein over the internal malleolus, while further exsanguination is being carried out carefully. In an infant, it is obvious that only a small amount of blood (up to 120 c. cm.) can be withdrawn before the transfusion must be started, so that after the commencement of the transfusion, the blood withdrawn from the patient must contain an increasingly large percentage of the transfused blood. Notwithstanding this, it is apparent that a considerable amount of the patient's own blood is withdrawn during the procedure, and it would seem to have been in such quantity that enough of the toxin was removed to turn the scales in favor of the patient.

The transfusion is carried out preferably with citrated blood in 100 c. cm. glass syringes, as by this method, a larger supply is more immediately available. It is a wise precaution to have adrenalin at hand for an intravenous injection should any signs of collapse occur during the exsanguination. If, during exsanguination, the margin of safety has been too closely approached and the pulse becomes imperceptible, the transfusion should be begun immediately and m $\bar{v}$ to m $\bar{x}$ of adrenalin 1-1000 given intravenously. This latter is best done by introducing the hypodermic needle into the rubber tube connecting the citrate syringe with the cannula in the vein. The immediate effect of the adrenalin is to produce a sudden blanching of the face, followed by a few dry coughs—the pulse improves almost immediately.

Case 1. G. S., male, age 3 years. Admitted on the afternoon of Dec. 6th, 1919. Forty-five minutes prior to admission, the child upset a

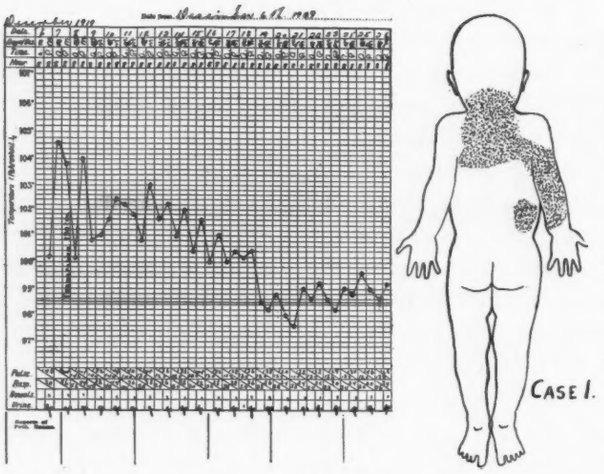

Fig. 2. (Case 1.)

bucket of hot water over himself and remained lying in the hot water for two minutes.

On admission, the general condition was fairly good. There was a 2nd and 3rd degree burn over the back of the neck, both scapular regions, right lumbar region, and right arm down to wrist. T. 98. Pulse 140. Resp. 44. Picric acid dressing applied.

Dec. 7th. 4 a.m. Temp. 101.6

8 a.m. Temp. 104.6. Pulse 160. Patient has had two convulsions and is very toxic. Blood transfusion of 190 c.cm. from father (both in group 4) and in addition 50 c.cm. normal saline.

Dec. 8th. One more convulsion at midnight. General clonic contractions over body. Subcutaneous injection of 200 c.cm. saline and of MgSO4 (8% solution 20 c.cm.) Further progress uneventful apart from development of chicken pox.

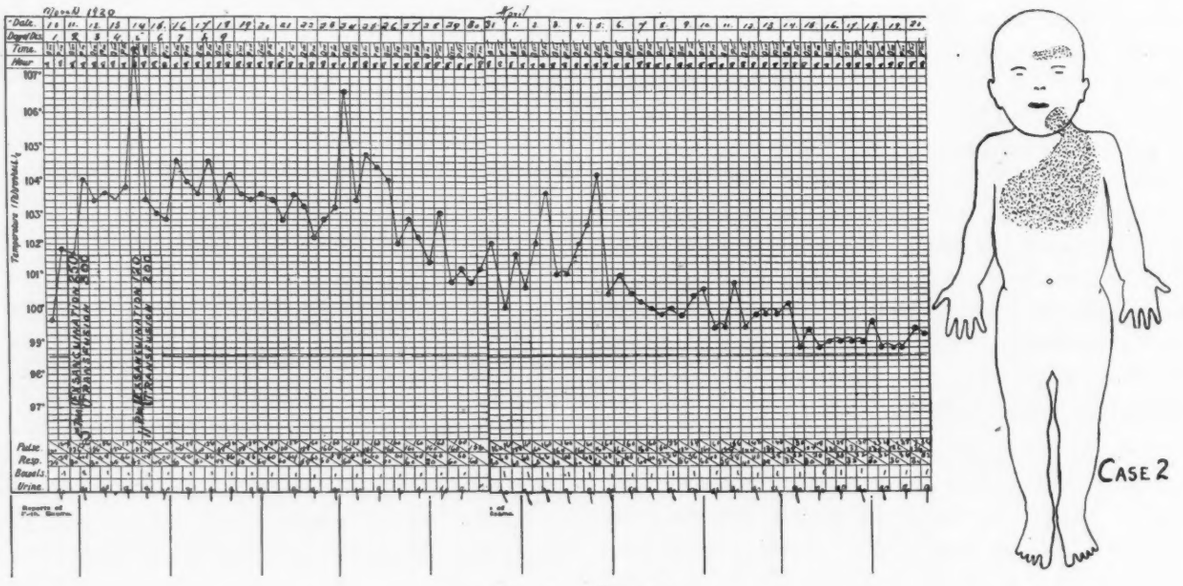

Fig. 3. (Case 2.)

Case 2. History No. 19942 E. H. Male. Age 1 year. Admitted on the afternnon of March 10th, 1920.

Three hours before admission, patient had sustained a severe scald from contact with hot jelly.

On admission, Temp. 99.3. Pulse 100. Resp. 28. General condition good, patient does not appear to be ill. There was a 1st, 2nd and 3rd degree burn of back from the 10th dorsal spine up to neck, and spreading over to the chin on the left side of face. Small area of 2nd degree burn on forehead.

March 11th. 2 p.m. Patient cyanosed and in a convulsion. Muscles in tonic contraction following convulsion with no tendency to relax. 12 c.cm. Mag. Sulph. (8% solution) subcutaneously, and Mag. Sulph. 3 drs. by mouth. Large enema when quiet.

4 p.m. Second convulsion. Muscles unrelaxed. Temp. 106.8. An hour later, exsanguination of 250 c.cm. and blood transfusion 300 c.cm. (group 4 to group 4) was carried out. Following this, the condition was somewhat improved and child nursed well.

March 12th. Relaxation still incomplete. 3rd convulsion 20 c.cm. of 5% MgSO4 given. Subcutaneously. Colour and breathing improved very shortly. Saline 200 c.cm. subcutaneously.

NOTE.—Extent of burned skin in each case is represented by dotted area on body outline accompanying temperature chart.

March 14th. In last two days there have been five mild clonic convulsions, to relieve which MgSO4 (5% solution) was given subcutaneously. Child not taking fluids very well. Given more saline subcutaneously.

11 p.m. Exsanguination 120 c.cm.

Blood transfusion 200 c.cm. Following this, colour and general condition improved.

March 15th. Passing urine well. Had six very mild clonic spasms. Receiving high cold colon irrigations. Signs of returning consciousness are apparent as insertion of needles for subcutaneous saline causes pain.

By March 18th. Eighth day of treatment—there was relaxation of muscles, though arms were still a little spastic. Chin and head burns dry. Burned area of back sloughing, but not infected. At this time, child developed a severe lobar pneumonia, for which the usual treatment was carried out, and on April 24th, was discharged from the hospital in excellent condition.

Case 3. N. H. No. 21966 Male. Age 2 years. Admitted Aug. 10th, 1920, 7 p.m. Two and a half hours prior to admission child sustained severe burns through its clothes catching fire.

On admission, T. 100. P. 150. R. 40. Patient a poorly-developed rachitic infant, is restless and crying. Some convulsive movement of limbs, respirations rather labored and rapid, mucus in throat. Burns of 1st, 2nd, and 3rd degree—face, both arms and thighs, burn of 4th, 5th degree of right hand.

11 p.m. Exsanguination 100 c.cm.

Transfusion 180 c.cm. (donor and recipient in same group) Saline 200 c.cm. (given very slowly) (Intravenously.)

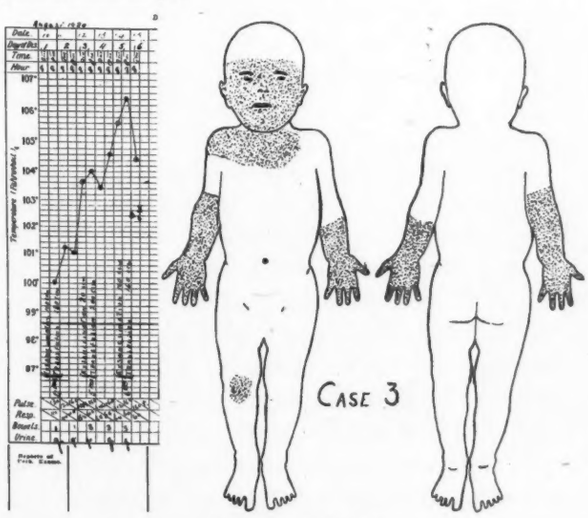

Fig 4. (Case 3.)

Aug. 11th. Patient improved. No muscular twitching, rales in chest.

Aug. 12th. At 5 p.m. Temp. 104. Condition becoming worse.

Exsanguination 20 c.cm. after which needle became dislodged from longitudinal sinus.

Transfusion. 200 c.cm.

Saline 100 c.cm. (given slowly) (Intravenously)

By 10 p.m. patient's condition improved.

Aug. 13th. No convulsive twitchings, taking fluids well, respiration rapid, but patient conscious.

Aug. 14th. Fairly well all day, till 6 p.m., when condition became worse.

Exsanguination 100 c.cm.

Transfusion 160 c.cm.

Saline 80 c.cm. intravenously.

Aug. 15th. Patient worse. Dullness at base of right lung posteriorly. High temperature, relieved for a time by cold colon irrigations. Died 6.40 p.m.

Autopsy showed intense purulent bronchopneumonia, with right base almost completely consolidated.

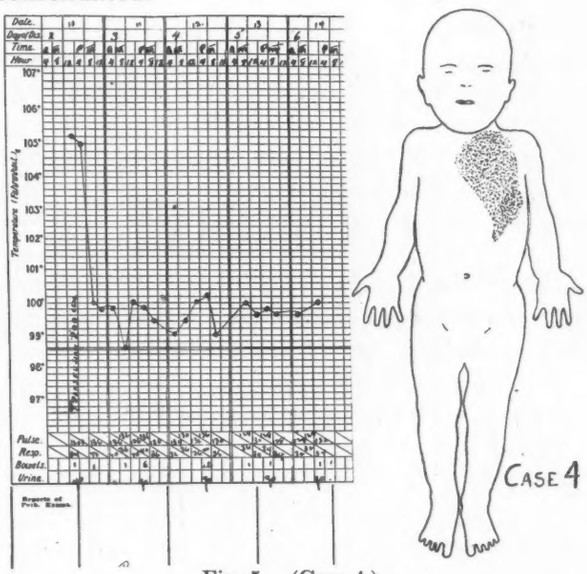

Fig. 5. (Case 4.)

Case 4. H.Y. Age 19 months.

Admitted in the morning of Dec. 10th, 1920. Two days prior to admission spilled hot coffee over the front of the chest. Patient said to be in good condition till this morning when she had two convulsions, one at 6 and one at 7.30 a.m.

On admission, Temp. 105. Pulse 160. Patient drowsy, toxic, and semi-delirious with convulsive twitchings, appears to be acutely ill. Area of burn over chest and base of neck about 40 square inches. Burn is of 1st, 2nd, and 3rd degrees.

On morning of admission, blood transfusion of 200 c.cm. was done (4% citrate) and 50 c.cm. saline were given into a vein. Following transfusion, condition improved though slight twitching of arms was present. 20 c.cm. Mag. Sulph. Sol. (8%) given subcutaneously.

Dec. 11th. General condition much improved, T. 100. Patient has lost the drowsy toxic appearance and is able to recognize her mother.

Dec. 15th. Condition improving steadily. Burned area clearing up. Discharged.

Feb. 11th, 1921. Burn well healed, and patient in excellent condition.

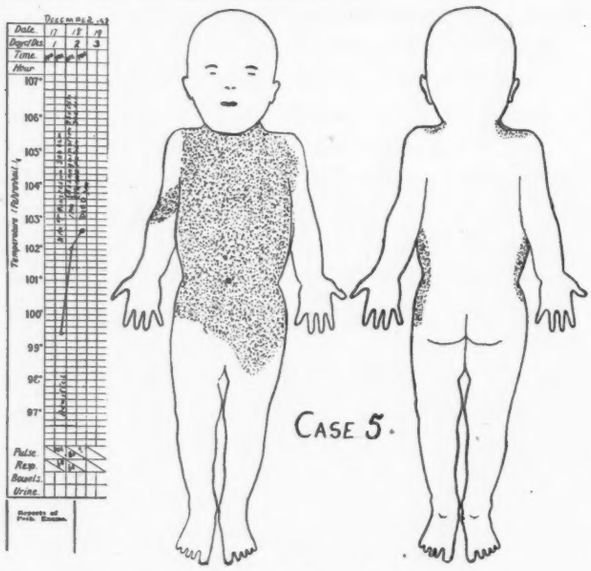

Fig. 6. (Case 5.)

Case 5. N. L. Male. Age 2½ years.

Admitted Dec. 17th, 1920. 3 p.m. Scalded 2 hours before.

Severe scald over whole anterior surface of chest and abdomen.

Patient in some degree of shock on admission.

5 p.m. Recovered from primary shock.

7 p.m. Circulatory collapse.

8.30p.m. Convulsivetwitchingsofarmsandlegs.

Transfusion 300 c.cm. Blood.

25 c.cm. Mg. Sol. (8%) subcutaneously.

This was followed by definite improvement.

Dec. 18th, 1920. 5 a.m. Convulsive twitchings 25 c.cm. Mg. SO4 (8%).

10 a.m. Condition poor but no convulsions.

1 p.m. Severe convulsion.

Exsanguination 260 c.cm.

Transfusion 300 c.cm.

Following this, patient's condition was very much improved, and he became quiet and rational.

4 p.m. Convulsive twitchings 25 c.cm. Mg. SO4 (8%).

8. p.m. Died following convulsion which lasted one hour. Necropsy refused.

Case 6. P.K. Age 1½ years.

Admitted March 1st, 1921 and still in hospital.

Scald of legs and scrotum of 2 hours duration.

Admitted in good general condition. No shock present.

March 2nd. 4 a.m. Patient drowsy.

11.20 a.m. Severe general convulsion, lasting 5 minutes, face and hands cyanosed. (Donor being searched for, father's blood incompatible.)

12 noon. Slight convulsion.

2 p.m. Exsanguination 200 c.cm.

Transfusion 400 c.cm. (foreign donor).

3 p.m. Convulsion, immediately after return

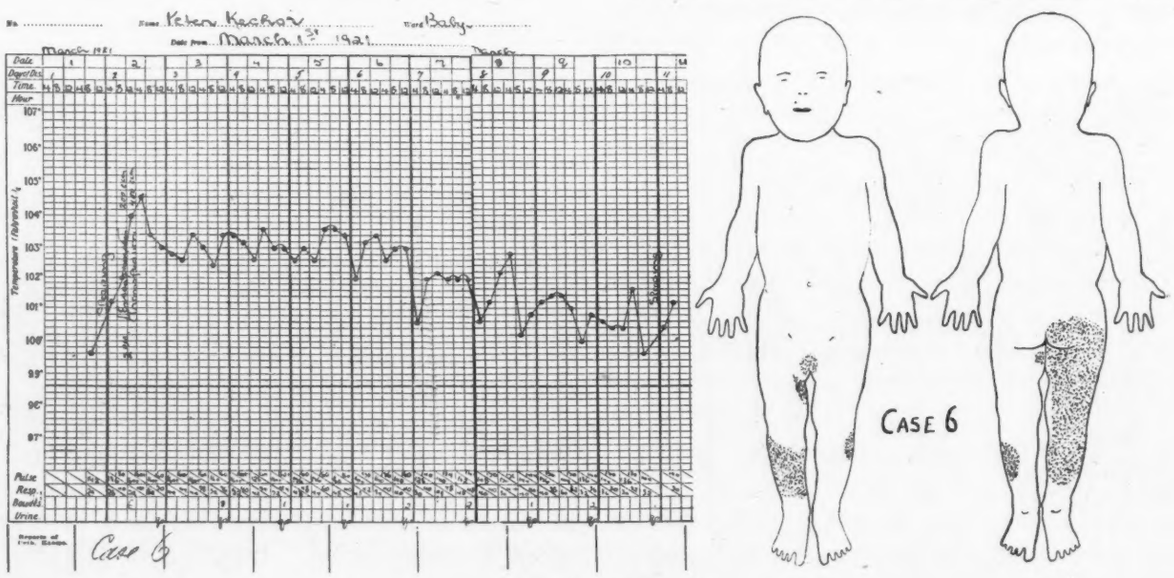

Fig. 7. (Case 6.)

from operating room. Lumbar puncture done; 45 c.cm. of clear fluid under considerable pressure. 3 c.cm. of Mg. SO (8%) introduced intraspinally.

March 11th. Steady improvement.

March 14th. Nasopharyngitis with otitis media. Burns in good condition and healing.

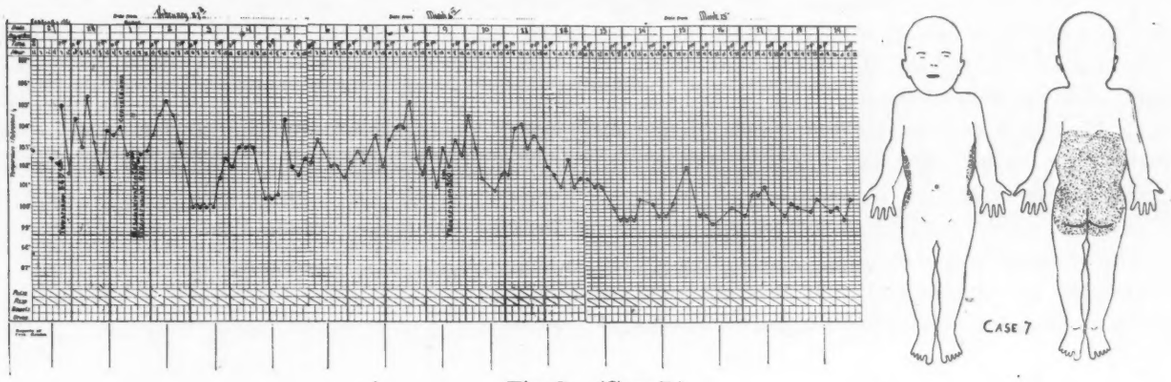

Fig. 8. (Case 7.)

Case 7. R.B., Male. Age 2½ years.

Admitted to Hospital March 27th, 1921.

Six days prior to admission, child had fallen backwards into a tub of scalding water. He had been treated at home with various local applications for a 2nd and 3rd degree burn, extending over the back from the lower angles of the scapulæ to the upper portion of the thighs, and forward to the mid auxiliary line on each side. Frequent doses of paregoric had been given for the relief of pain. He was desperately ill on admission to hospital, and the extent and severity of the burn were such that the prognosis seemed absolutely hopeless. On admission, the child was exceedingly restless and toxic. Morphia was given to control pain and borated vaseline on moist boracic lint was applied to the burns. In the hope of controlling the toxaemia blood transfusion of 360 c.cm. was done immediately.

Following transfusion, he showed moderate improvement, but the temperature remained high. Cold colon irrigations were given. These were of temporary benefit in lowering the temperature, but by March 1st the condition had become worse. The manifest circulatory collapse was treated by the giving of adrenalin m $\overline{v}$ and camphor gr. 2. There was increasing restlessness, and at noon, a severe convulsion occurred. Exsanguination (260 c.cm) and transfusion (400 c.cm.) was carried out. Following this, general condition improved somewhat, but there was intermittent twitching of arms and legs. Mag. Sulph. Solution (8%) was given subcutaneously at intervals in 20 c.cm. doses for the next four days to control the spasms.

By March 3rd, the general condition was very definitely improved, and the temperature somewhat lower. However, the improvement was not lasting, and by March 6th the condition was again very poor. Patient was taking very little fluid and passing very small quantities of urine. He was restless, was at times delirious, and slept for only short periods. This state continued till March 9th, at which date it seemed that the outlook was quite hopeless. The circulation was waning perceptibly, the face and hands were mottled and bluish, and the radial pulse was at times imperceptible. The toxaemia, was obviously increasing. As a last resort, blood transfusion was carried out (300 c.cm.).

The following day, the temperature began to fall and with the exception of an occasional rise, became steadily lower. The general condition improved daily, and by March 14th the child was taking solid food. Further progress has been uneventful; at the time of writing, April 29th, there are several large granulating areas over both loins. At no time during his illness did the urine show albumin or casts. From the extent of the burn in this case, it is difficult to see how he could have lived beyond the first four days.

Admittedly, this is a very small number of cases upon which to base conclusions and the method is yet on trial, but the results from other forms of treatment in this type of case have been so uniformly discouraging that a radical deviation from former lines of procedure was warranted. We have endeavoured to determine what sign or symptom is an indication for this therapy, but such measures as examinations of the blood and urine has shown nothing suffi-

ciently definite, so far, to point the way, and we are forced to rely upon the clinical points like rising temperatures and general evidences of increasing toxemia. The occurrence of a convulsion is a certain indication, but, unfortunately, a late one, and it would be safer to institute treatment before the toxin has been so fixed as to cause convulsion. Our experience has been that in a case under two years of age, in which the burns have been severe enough to cause a convulsion, it is rare to see recovery follow any other method of treatment.

The animal experimental work and blood chemistry in connection with this subject are being carried out in conjunction with Dr. Gladys Boyd, in the Research Laboratories of the Department of Pediatrics. The results will be reported in a subsequent paper.

Out of seven cases of severe toxic shock from superficial burns, showing symptoms which we are accustomed to consider as those almost invariably present in the fatal cases, five have recovered completely. This is considered sufficient justification for the appearance of an advance clinical report in the hope that other workers in the field might gain some advantage from its perusal.

*Dupuytren's classification.

1. Weiskotten, H. G., *Histopathology of Superficial Burns, J.A.M.A. 72: p. 259.* Jan. 25, 1919.

TABLES RELATIVE TO THE TRANSFUSION OF BLOOD

I. Maclaren Thompson

Department of Anatomy, McGill University, Montreal

THOSE who practise the transfusion of blood endeavour to prevent undesirable sequelae by carrying out preliminary tests to ascertain the group to which the blood of the donor and that of the recipient belong. Four groups are commonly recognized, and are designated 1, 2, 3 and 4.

The agglutination reactions of these groups are expressed in the following table:

TABLE I.

	Erythrocytes				
	Group	1	2	3	4
Serum	1	0	0	0	0
	2	+	0	+	0
	3	+	+	0	0
	4	+	+	+	0

+ = agglutination.
0 = no agglutination.

The test for selecting a donor is frequently made by testing suspensions of the erythrocytes of the donor and of those of the recipient against standard sera of groups 2 and 3. The following table, which is obviously derived from Table I., shows how the group of each unknown blood is ascertained.

TABLE II.

Unkown erythrocytes	Serum of		Group to which erythrocytes belong
	Group 2	Group 3	
x	+	+	=1
x	0	+	=2
x	+	0	=3
x	0	0	=4

+ = agglutination.
0 = no agglutination.

Concerning the explanation of these well-known facts, much has been written. Von Dungern and Hirschfeld offer what is probably the best explanation, of which the following summary presents the essentials.

In the human species there are four varieties of erythrocytes:

(1) Erythrocytes A, which possess an agglutinable property termed A.

(2) Erythrocytes B, which possess an agglutinable property termed B.

(3) Erythrocytes AB, *each* of which possesses both agglutinable properties A and B.

(4) Erythrocytes O, which possess neither agglutinable property, neither A nor B.

In the human species there are only two varieties of agglutinins for human erythrocytes.

(1) Agglutinin anti-A, which acts upon the agglutinable property A, and therefore upon erythrocytes A or erythrocytes AB.

(2) Agglutinin anti-B, which acts upon the agglutinable property B, and therefore upon erythrocytes B or erythrocytes AB

The contents of the four groups are shown in the following table:

TABLE III.

	Ordinary Terminology	Von Dungern and Hirschfeld Terminology		Erythrocytes	Agglutinins
Blood of Group.	1	AB	Contains..	AB	Nil
Blood of Group.	2	A	Contains..	A	Anti-B
Blood of Group.	3	B	Contains..	B	Anti-A
Blood of Group.	4	0	Contains..	0	Anti-A and Anti-B

Accepting the work of von Dungern and Hirschfeld, it is apparent that Table III. furnishes an explanation of Tables I and II.

I have constructed Tables IV. and V. which, in addition to showing the facts contained in Tables I. and II. respectively, show the explanation thereof in terms of von Dungern and Hirschfeld's results, as embodied in Table III.

TABLE IV.

	Blood contains erythrocytes	AB	A	B	0
Serum contains agglutinins...	Group	1	2	3	4
Nil.	1	0	0	0	0
Anti-B.....	2	+	0	+	0
Anti-A.....	3	+	+	0	0
Anti-A and Anti-B.....	4	+	+	+	0

+ = agglutination.
0 = no agglutination.

TABLE V.

Unknown Corpuscles	Serum of		Group to which unknown erythrocytes belong
	Group 2 contains agglutinins Anti-B	Group 3 contains agglutinins Anti-A	
x	+	+	contains cells AB ∴Group 1.
x	0	+	contains cells A ∴Group 2.
x	+	0	contains cells B ∴Group 3.
x	0	0	contains cells 0 ∴Group 4.

+ =agglutination.
0 =no agglutination.

So far as I know, no such tables as these have hitherto been constructed. Tables IV. and V. are now published in the hope that they may be of interest to those who practise the transfusion of blood.

THE VITAMINES IN THERAPEUTICS

Why should a physician prescribe vitamine preparations if all the known vitamines can be found in natural foods? Why not simply direct the patient as to the kinds of food to eat? These questions naturally suggest themselves to thoughtful medical men at a time when so much is written on the subject of vitamine deficiency.

In favor of using the extracted vitamines there seems to be scientific evidence that is bound to command our respect. Take, for example, the work of Eddy. This keen observer found that, even though the diet of the child contained an appreciable amount of vitamine B, there was a marked stimulation of growth when three per cent. of a vitamine extract was added to the food. He explained this on the basis that an extracted vitamine is more readily available than that which is contained normally in food.

Besides, it is easily conceivable that the ingestion of the requisite quantity of any one of the vitamines as found in its natural state would entail the performance of gastronomic feats that would be far from salutary.

Altogether it does seem that a preparation of extracted vitamines, such as is offered by Parke, Davis & Company under the name of Metagen, fills an important therapeutic niche. Metagen has been subjected to carefully conducted clinical investigation and is physiologically standardized for the presence and activity of all three of the vitamines.

UNSUSPECTED SYPHILIS OF THE NERVOUS SYSTEM: ITS LABORATORY DIAGNOSIS

H. B. MAITLAND

Assistant Professor of Pathology and Bacteriology in the University of Toronto

IN THREE PARTS

PART II.

Continued from September issue

A classification of cases into "stages" such as primary, secondary and tertiary leaves much to be desired. The process of infection is continuous. The stages depend on tissue reactions that are notably irregular in their intensity and in the time when they appear. Such a classification is therefore based on a variable quantity and is so inexact that it fails to be scientific.

Syphilis is the one outstanding disease that lends itself to experimental methods. The date of infection, the diagnostic tests, and a specific therapy can all be accurately controlled, and therefore in studying, for example, the effect of a particular form of treatment, it is possible to arrive at conclusions experimentally accurate. In such a study it is essential that cases should be considered in groups composed of similar patients, and two important particulars that should be similar are the duration of the infection and, as we shall point out, the state of the nervous system. The classification in popular use is, therefore, not satisfactory. In an endeavour to arrive at some suitable system of classifying the cases of this series it was decided to use as a basis, the length of time elapsed since infection, the clinical features were, however, also taken into account.

The cases were classified under four types as follows:—

A.—A man with an inoculation lesion in whom the Wassermann reaction had not yet become positive.

B.—A man with an inoculation lesion or with a history of such, but with no other outward signs or history of a general infection except glandular enlargement and a positive Wassermann reaction, up to and including eighteen months from the date of infection.

C.—A man with outward signs or history of a general infection including a positive Wassermann reaction up to and including eighteen months from the date of infection.

D.—A man with or without symptoms or signs over eighteen months from the date of infection.

The types A and B include all the cases of "primary" syphilis. C cases are the acute or recent cases of "secondary" syphilis but some early "tertiary" lesions may come into this division. The D cases include not only late "secondary," but also "tertiary" and most "latent" infections.

The results of the Examination of the Central Nervous System:—

1.—THE CEREBROSPINAL FLUID

In this investigation 1,314 cases of syphilis were examined; of these 236 had an increase in cells of ten or more per c.mm., while 135 were classed as doubtful as to affection of the nervous system with five to nine cells per c.mm. Thus 18 per cent. of these cases had a definite increase in cells and 10 per cent. a slight increase, the meaning of which was doubtful. If this "doubtful class" is abnormal, as later results seemed to indicate, then 28 per cent. of this series had altered cerebrospinal fluids. This is an average figure. The incidence of abnormality was greater in some types than in others, as shown in the following table:

TABLE SHOWING THE INCIDENCE OF ABNORMALITY IN THE DIFFERENT TYPES.

Type	Number of Cases.	Number with Definite Increase in Cells of Spinal Fluid.	Number with Slight Increase of Cells "doubtful cases."
A	144	4	17
B	371	42	38
C	512	110	50
D	287	80	30
	Results expressed as percentage of cases.		
A		3	11
B		11	10
C		21	9
D		27	10

This table shows that even before the Wassermann reaction becomes positive, a few cases may have a definitely increased number of cells. At a later period when the Wassermann reaction has become positive the number of cases certainly affected, as shown by cell counts, becomes larger, and gradually mounts until during the so-called secondary period when 21 per cent. will give an abnormally high count, and 9 per cent. will show the slighter increase, and may be classed "doubtful." With regard to type D it is of interest to note that the cases without clinical signs of active syphilis, namely "latent" cases, have a higher incidence of abnormality in the cell count of their spinal fluids than have those with active lesions. This is shown in the following table.

TABLE TO SHOW SPINAL-FLUID-CELL ABNORMALITY IN TYPE "D" CASES

	Number	Number with cells increased markedly	Per-centage.	Number with cells slightly increased	Per-centage.
With active signs	112	20	17	14	12
Without active signs	175	60	34	16	9

The high percentage of increased cell count in cases without active signs (latent cases) is striking; it is twice that of the cases with active signs.

The relation of the Wassermann reaction in the cerebrospinal fluid to the various types is given in the following table.

TABLE SHOWING THE INCIDENCE OF POSITIVE WASSERMANN REACTIONS IN THE CEREBRO-SPINAL FLUID IN THE VARIOUS TYPES OF THE DISEASE.

Type	Number of Cases.	Number with positive W. R.	Number per cent. with positive W.R.
A	144	0	0
B	371	12	3
C	512	35	6
D	287	53	18

It is seen that in early syphilis a positive reaction in the cerebrospinal fluid was not observed until the reaction had become positive in the blood, but cases were seen which gave a positive reaction in the cerebrospinal fluid as early as four and five months after the date of infection. In type D more positive reactions were obtained from "latent" cases than from cases with active signs, this finding agreeing with the abnormality of the cell count.

It is of interest to inquire whether a positive Wassermann reaction in the fluid has any constant association with a particular number of cells. This is shown in the following table.

TABLE SHOWING THE RELATION OF THE POSITIVE WASSERMANN REACTION IN THE CEREBROSPINAL FLUID TO THE NUMBER OF CELLS.

Number of Cells in C.S.F.	Number of Cases with Positive W.R.	Number of Cases with W.R. Negative
0– 9	5	1072
10– 19	5	77
20– 49	8	43
50– 99	21	15
100–149	13	5
150–199	9	4
200–299	9	1
300–499	12	2
500–999	6	2
1000	3	0

This table shows that in the spinal fluid, an increase of cells may be found more often than a positive Wassermann reaction and that therefore a cell count is a much more delicate index of infection. There were only five cases in which a normal cell count was associated with a positive Wassermann reaction. Such a finding was unusual. In three of the five cases it could be accounted for as a result of treatment of a case whose fluid had originally been grossly altered. The other two were unusual cases in that they had had no previous treatment. Their histories are as follows:

Case 1978. Infected July, 1918. Had a penile sore late in July, and a rash early in September, 1918. Examined on October 5, 1918: Scars of sores in sulcus, general adenitis, macular syphilide. Serum Wassermann positive. Spinal fluid—506 lymphocytes+14 polymorphs, Wassermann negative.

Case 1135. Infected late in December, 1917. Examination May 4, 1918: Scars of multiple indurated small ulcers in coronal sulcus and on under surface of prepuce; Treponemata not found in either of two examinations, but local antiseptics had been applied; general adenitis; gonorrhoea. Serum Wassermann weakly positive. Spinal fluid—476 lymphocytes,

Wassermann negative. One week later the Wassermann reaction in the serum was negative.

2. The Motor and Sensory Functions of the Nervous System

The examination of the central nervous system, the internal ears and the special examination of the eyes was undertaken on a selection from the first 624 cases of this series. The following table shows the number of cases with signs or symptoms of nervous disease.

Type of Case	Number of cases with abnormal C.S.F.	Number of cases examined neurologically.	Number of cases with clinical evidence of disease in C.N.S.
A	2	2	0
B	20	16	0
C	56	47	10
D	38	34	13

Many of the abnormalities were not marked. Some typical examples are as follows:

Case 139. Complained of weakness in his legs after walking.

Case 548. For one month he had noticed that sometimes he was dizzy for a few moments after rising from a chair. He had been doing full duty in his ship until he came to hospital on account of his rash. He had no other symptoms, but his cerebrospinal fluid contained 1,000 cells per cubic millimetre.

Case 958. Insomnia, nocturnal headache, vertigo.

Case 1071. Paralysis of facial muscles on left side. Diminished sensation over area supplied by fifth cranial nerve on the left side.

The central nervous system was examined in 22 "doubtful" cases, some from each division. In only one case (Division C) was any abnormality found.

3. The Examination of the Function of the Internal Ears

The results of the examination of the internal ears may be summarized briefly by stating that in this series diminished bone conduction was not a reliable indication of abnormality of the cerebrospinal fluid.

A series of non-syphilitic controls showed so large a percentage with similar diminished bone conduction that the finding was rendered valueless in syphilitics.

This is not in accord with the results shown in the series of Wile and Stokes.

4. The Examination of the Eyes

The following table shows the frequency of pathological findings in the eyes of cases with positive cells:

Type	Number of cases with abnormal C.S.F.	Number of cases whose eyes were examined	Number of cases with abnormal eyes
A	2	0	0
B	20	4	4
C	56	29	19
D	38	20	17

These examinations were made by Surgeon-Commander R. J. E. Hanson, F.R.C.S., R.N.V.R. who was able to recognize certain early but well defined changes in the eye grounds of these cases. The following are his notes of this condition:

"Retinitis ex Lue" (Early Stage)

Typical Signs.—The conditions vary in their intensity, but three types of signs in the fundus oculi were noted:

(1) *Hyperaemia.*—The retinal venules especially were overfull.

(2) *Engorgement.*—Enlargement and cloudy appearance of the perivascular lymph spaces around the retinal vessels and around the papilla. (Luetic halo.)

(3) *Pigment Overgrowth and Disturbance of the Retina.*—Small rounded woolly-looking opacities with fine spidery connective tissue changes, without apparent upset of the functions of the rods and cones.

In relation to No. 2 above, it is interesting to recall that there are physical and chemical changes in the cerebrospinal fluid, and that this is intimately connected with the subarachnoid contents, and these last with the retinal lymphsterams.

With regard to No. 3 above, one rcalls the extensive pigmentation changes in the skin lesions of the secondary stage.

Summary.—There was little evidence of interference with function—i.e., with fields, formsense, light difference, and colour thresholds. No alterations in the fundus oculi were observed in the cases seen shortly after the appearance of the innoculation lesion. In the latter cases the changes in the fundus oculi were:

(1) Symmetrical.

(2) Mainly peripheral.

(3) Diffuse and not circumscribed, i.e., not more marked nor intense at one part of the periphery than another.

No hyalitis nor choroiditis was observed but an underlying condition of choroidal endarteritis may be present in these cases of stippling of the fundus oculi.

STANDARDISATION OF CERTAIN PREPARATIONS OF DIGITALIS*

D. S. Lewis, M.D., and C. F. Moffatt, M.D.

OWING to the irregularity of the clinical results following the use of digitalis in this hospital, due allowance being made for varying clinical indications, it was thought advisable to standardise the preparations used in the wards. Later this was extended to include a number of preparations commonly employed in Eastern Canada.

Seven tinctures and the infusions made from five different lots of digitalis leaf were examined, as well as certain of the active principles.

The work of Pratt,[1] Warfield,[2] Rowntree and Macht,[3] in America, and of Symes[4] and others in England has shown how great may be the differences in the strength of so-called official preparations. One of the basic reasons for these variations is the difficulty of measuring the activity of the drug. The drug cannot be analysed by direct chemical means, but its strength must be determined by its action on experimental animals.

There are two methods of assay, the "frog method," suggested by Houghton[5] in 1898, and the "cat method" introduced by Hatcher and Brody[6] in 1910. The former method is advised by the Pharmacopoea and has the advantage of economy, while the latter has the advantage of giving results which can be applied more directly to the use of digitalis in man. In the present studies we have made use of a slightly modified "cat method" described by Rowntree and Macht.

Method

A healthy cat weighing preferably from 1.5 to 2 kilos. is etherised, and a needle connected with a burette is inserted into the femoral vein. The cat is kept sufficiently under ether to prevent struggling, and the solution is run in at the rate of 2 cc. per minute for the first five minutes, and then 1 cc. every 2 minutes until the heart stops. The infusions are used in full strength, but the tincture should be diluted to ten volumes with salt solution, and the active principles should be injected after being dissolved or suspended in salt solution. The total amount injected divided by the weight of the cat, gives the Minimal Lethal Dose (M.L.D.) of the preparation per kilo. of cat, and from this is calculated the amount of digitalis leaf represented by the preparation. During the injection the heart rate is counted by stethoscope, and notes are made of the quality and rhythm of the sounds. The respirations and general behaviour of the animal (retching, etc.), are also noted.

The following is a typical experiment:

Tincture No. 2. (Diluted 1:10).
Dec. 29th, 1920. Healthy cat, weight 2.58 kilos. Light ether.

Time.	Rate Injection	Pulse	Remarks
3.21	Injection started	208	
3.26	First 10 cc. ended	160	
3.28	1 cc. injected	144	
3.30	1 cc. "	140	
3.32	1 cc. "	124	
3.34	1 cc. "	164	Extrasystoles
3.36	1 cc. "	216	Heart regular again
3.38	1 cc. "	225	Retching.
3.40	1 cc. "	?300	
3.42	1 cc. "	?300	
3.44	1 cc. "	?	Sounds very weak, irregular.
3.45	Heart stopped, Breathing continued 30 secs. longer.		

Total amount injected. 19 cc.
Amount per kilo..... 7.4 cc. = 0.74 cc. undiluted tincture.
= 74 mg. digitalis leaf.

This experiment shows all the characteristic features, an initial slowing, which is due partly to vagus stimulation, followed by the appearance of extrasystoles, a rapid increase in rate as the action on the heart muscle becomes stronger, retching, finally ventricular fibrillation and a cardiac death. The respiratory centre continues to function for some seconds after the heart stops.

Two or more determinations are made of each

*From the Medical Clinic, Royal Victoria Hospital, Montreal, and the Department of Pharmacology, McGill University.
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specimen, and the average of these is taken to represent the strength of the drug. The results are stated in milligrammes of digitalis used, per kilo. of cat, the stronger the preparation, the smaller will be the amount necessary to produce a fatal result. In 1910 Hatcher and Brody found the average "cat unit" (amount of digitalis per kilo. necessary to stop the heart) of a good specimen of digitalis leaf, to be between 80 and 100 mg. and this quantity is still accepted.

Preparations

The tincture is prepared by extracting 100 gms. of digitalis leaf with 1,000 cc. of dilute alcohol, and roughly speaking the B.P. and U.S.P. tinctures are interchangeable. The infusions, however, differ in strength and in their mode of preparation. The B.P. infusion is made by infusing 7.5 gms. of a No. 20 powder for fifteen minutes in a litre of boiling water. The U.S.P. calls for the use of 15 gms. of unpowdered leaf, and its infusion with 500 cc. of water for one hour, and its subsequent dilution to 1,000 cc. with dilute alcohol and cinnamon water.

Hatcher[7] has proved recently that infusions prepared by the latter method are very irregular in strength even when made from the same batch of leaves. His more accurate method was published after the completion of our work, and the infusions here reported were made by the usual procedure of infusing coarsely powdered leaf in B.P. proportions.

Tincture of Digitalis

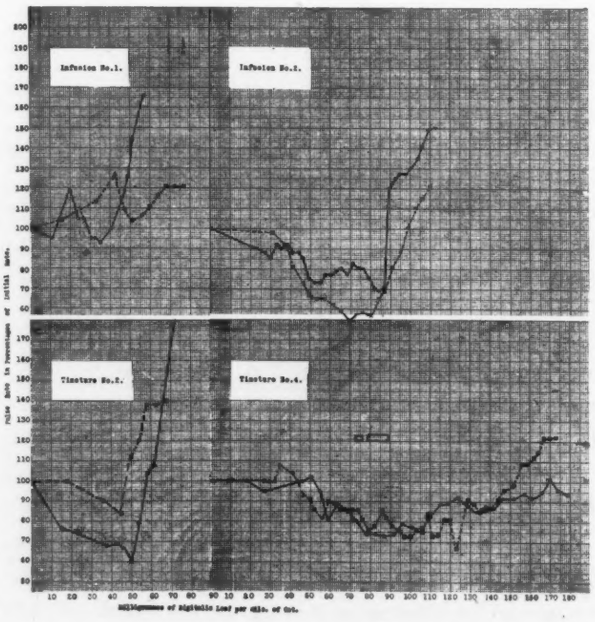
The tincture represents the activity of the leaf completely, all three principles, digitalein, digitalin and digitoxin being soluble in the dilute alcohol used in its preparation. It was found that four of the seven (Table I.) showed a strength quite in keeping with the standards of a good tincture, that is, 1 cc. of tincture (100 mg. digitalis leaf) or less, constitutes the minimum lethal dose per kilo. of cat. Some indeed were much stronger, requiring only from 0.7 to 0.8 cc. per kilo. On the other hand one concentrated tincture (No. 1) was almost 60 per cent. below its reputed strength, and one tincture of B.P. strength (No. 4) was 78 per cent. below standard. A third was 14 per cent. under strength, so that three out of the seven preparations were notably below standard. This conforms closely to the results obtained in other centres. The low strength of the concentrated tincture is of interest in view of the reports of Symes (4) that tinctures much above strength almost always show more rapid deterioration

Table I.—Tinctures of Digitalis

Preparation.	Total Assays.	M.L.D. in mg. Digitalis leaf per kilo. of Cat.	*M.T.D. in mg. Digitalis leaf per kilo. of Cat.	Extrasystoles.	Maximum Slowing per Min.	Vomiting.
Tincture No. 1..	2	155	72	++	104	−
" No. 1a.	1	89	51	+	96	−
" No. 2..	2	71	48	+	58	+
" No. 3..	3	83	46	++	28	−
" No. 4..	2	178	81	+	66	−
" No. 5..	3	86	42	+	39	++
" No. 6..	2	73	49	+	54	+
" No. 7..	1	114	55	+	60	−

than do those of standard activity. The concentrated tincture may be more reasonably priced, but its stability is in some doubt.

A study of the response of the heart, as gauged by the pulse rate and the appearance of irregularities, etc., shows a difference between the various preparations. One or two of the tinctures produce practically no slowing of the heart rate and few if any extrasystoles, while others cause a drop in the rate to half its initial value, followed by a more or less sudden rise to the



final tachycardia which immediately precedes the fibrillation of the ventricles. (See charts). Although these are well recognized digitalis effects we are unable to decide whether or not these differences have any importance in the therapeutic efficiency of the preparation, but the lesser grades of slowing are seen usually in the more toxic or more active tinctures, and it is possible that the period of vagus stimulation is passed very rapidly during the first five minutes when the drug is being injected at the maximum speed.

Infusions of Digitalis

The infusions are not so satisfactory, they are difficult to prepare, and Rowntree and Macht[3] have showed how the strength may vary even when made from the same leaves but with slight variations in the method employed in their preparation. The chief difficulty, however, has been to obtain anything like a fresh batch of reliable leaf. Two of the specimens of Allen's leaf had been obtained before the war, and on one of these the certificate was dated February, 1910. The retailer as a rule has no knowledge of either the brand or age of the leaf which he employs, simply ordering so much leaf from the wholesaler, and receiving whatever is in stock at the time. One such specimen looked more like the sweepings of a weed bin than a pharmaceutical preparation. In only one case was the leaf of recent date, and this gave a titre practically as high as any of those tested, either tincture or infusion, namely 74 mg. per kilo. The minimum lethal dose of the 1910 leaf was 112 mg. per kilo. but the others varied from 15 to 40 per cent. below standard.

Table II.—Infusions of Digitalis

Preparation.	Total Assays.	M.L.D. in mg. Digitalis leaf per kilo. of Cat.	*M.T.D. in mg. Digitalis leaf per kilo. of Cat.	Extrasystoles.	Maximum Slowing per Min.	Vomiting.
Infusion No. 1...	2	74	35	−	12	−
" No. 2...	2	112	56	+	69	−
" No. 3...	2	107	48	+	47	−
" No. 4...	3	117	58	++	54	+
" No. 5...	3	132	64	++	61	−

*Amount necessary to produce extrasystoles or the maximum degree of slowing of heart rate.

In practice it seems that the infusion has much against it. It is difficult to prepare, and the initial certificate bears little relation to the potency of the finished product. Tinctures on the other hand are readily made from any active leaf, and the results of the present investigation have shown a satisfactory strength in four of the seven tinctures. Two of these were made by Montreal houses, a third was an English tincture and the other was prepared in the Middle West. In every way the tincture is the more satisfactory preparation.

Strophanthin

Levene[8] shows that French Ouabain (Arnaud) has almost twice the strength of the strophanthin sold in New York. The minimum lethal dose of the latter is 0.0001 gm. per kilo. Similar products obtained in Montreal show an even greater loss of potency, the fatal dose averaging 0.00017 gm. that is about 70 per cent. below even the American strength. This weakness of the drug depends in large part on its age, Levy and Cullen[9] having shown that strophanthin if sealed in soft glass ampoules rapidly loses strength due to the breaking down of the glucoside in the faintly alkaline medium which results from the solution of the glass container.

Strophanthin is a dangerous drug even at the best, and this variability does not add to its value as a cardiac remedy.

Digitalin

The hypodermic tablets put up by a well known firm were dissolved and suspended in normal salt solution, and this suspension was injected in the usual way.

The results confirm those already reported, namely that digitalin often has little therapeutic strength. The usual dose of the drug is from 1/100 to 1/60 grain. In the preparation tested the minimum lethal dose was found to be 0.0081 g.m (1/8 grain), and the minimum toxic dose 0.0047 gm. (1/15 grain) per kilo.

Of what use then would any such preparation be when given in doses of 0.000016 gm. (1/3,600 grain) per kilo. as is the usual practice in medicine. Until a more active and reliable form of digitalin has been found, this drug can have no place in cardiac therapeutics.

SUMMARY

1. Seven tinctures and five infusions of B.P. strength were tested in twenty-eight different experiments by means of the "cat method."
2. Four tinctures were found to be of satisfactory strength. Three were notably weak. One or two tinctures produced few objective signs of digitalis action while others had a sudden explosive-like toxic action.
3. The infusions were not so satisfactory as the tinctures, only one preparation coming within the standard.
4. The active principles tested, strophanthin and digitalin, were much below standard, and not found to be reliable.

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RESEARCH IN MEDICINE *

WILLIAM CHARLES WHITE, M.D.

Medical Director of the Tuberculosis League of Pittsburg

IT is a difficult task to carry a message, even to the intelligent, educated human, immediately after his annual dinner. One must be entertaining and slip across the secret of his intention, disguised by condiment, or its potency is lost, because the patient refuses to take it. And so I have written what I wish to say, in the hope, that if but a fragment of the truth which I trust it contains remains, you will refer to the written text for another dose.

So great a stimulus was given to research by the necessities of the war through which we have so lately passed, that even a body so varying in the character of its personnel, as the American Federation of Labor, has seen fit to pass resolutions urging that part of its funds be spent in the development of new knowledge. True research, however, cannot be developed by the appropriation of funds alone. The ground work of the human family must flash forth sparks of genius before true research is likely to develop. The war took from our midst many potential servants of that elusive mistress—research.

We may agree with the English Historian, Buckle, that progress depends upon skepticism and only retardation of progress results from the restriction of governments. I feel that if Buckle lived to-day he would include also the restriction of great monetary foundations. Or we may believe his view—"that there is a spiritual a poetic and, for aught we know, a spontaneous and uncaused element in the human mind which ever and anon suddenly and without warning gives us a glimpse and a forecast of the future and urges us to seize truth as it were by anticipation." Or, on the other hand, we may follow the belief that universal education will produce more travelers into the unknowable field and so provide by the summation of their excursions the elysian fields we look for. But these are for the moment unimportant; for true it is, in spite of the fact that we have, during the last half century, made universal education the goal, not only of governments for their peoples but also of voluntary organizations of technical and semi-technical character, that we have not yet found the secret of producing research workers at will.

Universal education has had one curious influence epitomized by Sir Almroth Wright at breakfast one morning in Paris, "You Americans

* Read before the Ontario Medical Association, Niagara Falls, June, 1921.

do so much sham research. You make one thousand blood counts, one thousand urine analyses, one thousand ovariotomies, and add them together and think you have produced research." I have always thought that he suffered on this particular morning from hyperchlorhydria, which, as you know our great physician and teacher, Sir William Osler, declared was a reason for excluding individuals from contact with their fellow men until the luncheon hour. Wright's remark followed a dissertation upon his attempts to reduce the ten divisions of decalogue to three comprehensive ones of his own. Wright, like his friend Shaw, has the power, in satirical phrase, of making a shred of truth appear as the whole truth, and while he created a laugh at our expense, he offered nothing which would enable us to construct the pathway out of our difficulties.

A single example will show that less than a thousand analyses on the method laughed at by Wright resulted in the evolution of a great law, and this example occurred within the lifetime of every member of this Association.

In 1900 Dr. Edward Cowles established at McLean Hospital for the Insane, at Waverley, Massachusetts, a chemical laboratory. To this was invited a young chemist, Otto Folin, to undertake the study of metabolism in connection with insane patients. The underlying approach to metabolism at that period was urine analysis in a patient with nitrogenous equilibrium and a known intake of nitrogen and other elements. From this base Folin started, only to find that there did not exist in the world in 1900 a single complete analysis of human urine. To this task he set himself with patience and new methods, placing his results in tables day after day. I am not sure that his examinations either reached or exceeded one thousand, but from his columns it was at once apparent that his Kreatinin nitrogen and his neutral sulphur remained constant, whereas his other compounds varied with the intake of food. From this patient study there was evolved on a sound basis his law of endogenous tissue metabolism and exogenous or intermediate metabolism; so that Wright's criticism of one of our methods is not the whole truth. Even method of procedure, however, is dependent upon the brains of the man who follows it.

If we next turn our attention to a search for common factors in those who have produced what may truly be called research, resulting in great steps forward, we are, I think, forced to conclude that these lie not within the hands of man but in the hands of God.

Let us take a few examples and measure them by such common factors as we have—for example, parentage, position in the family, type of education, memory, opportunity, and faculty of generalization. Let us take a few of the giants among the ancients, as well as a few among the moderns, about whose achievements there can be no question. The names I choose are known to us all: John Hunter, Vesalius, William Harvey, Mendeljeff, Mme. Curie, and Emil Fischer.

John Hunter was the youngest of ten children. Little is known of his parentage. His father died when he was ten years of age. His early education was neglected. Prior to his journey to London at twenty years of age, to take up the study of anatomy, at the request of his brother William, he was a ships' carpenter. He disliked and had little knowledge of Latin and Greek, yet these were the source of recorded knowledge at that time. He made his own opportunities, however, and created the nucleus of the Hunterian Museum. He had the power of observing everything, bringing all his observations under one point of view, and then of filling in the connecting links of their correlation. Memory was one of his outstanding faculties and

> "He was one whom, not to sleep, allowed the needy time;
> To whom repose was lost and sport a crime."

And there is scarcely a field of biology which he has not enriched.

William Harvey was the eldest of nine. His parentage was most respectable, his father reaching the position of mayor of his village. He was given every advantage of education for his time, at Canterbury, Cambridge, and then at the great medical school at Padua. Opportunity was open to him by marriage and associations. At the age of fifty, after years of labor and difficulty, he gave to the world our knowledge of the circulation of the blood in "De Motu Cordis," published on the foreign press at Frankfort-on-the-Main. He was eccentric, doing much of his thinking in caves which he had prepared beneath the ground that he might meditate there in the darkness. His memory was magnificent, and his power of generalization highly developed. Obviously, from these two examples no argument for great families can be

deduced by those parents who seek to give birth to genius, for Hunter was the last of ten children while Harvey was the first of nine.

Andreas Vesalius was born of a long line of eminent physicians; his great grandfather, his grandfather, and his father; two of these reached the dignity of physicians to Royalty. He had a perfect knowledge of Greek and Latin. His position in the family is unknown. His education was excellent, he being taught by great teachers in the University of Louvain. His principal teacher was Sylvius. He was condemned by the Inquisition and saved by Philip, who made the condition of his salvation a pilgrimage to Jerusalem. He later had every facility for research afforded him by his chair of Anatomy at the medical center at Padua. He died at the age of fifty, shipwrecked on the Island of Zante. He opposed in his teachings all that had preceded him and yet at the age of twenty-eight appeared his "De Humani Corporis Fabrica," which created for him the position of father of human anatomy. These men came in the beginning of things as the world emerged from its dark ages.

Let us now take three of the giants within our own time in our search for the elusive something which we would create if we could:—Mendeljeff, Curie and Fischer.

Mendeljeff, born in Siberia, the youngest of fourteen children, came from a mixture of Russian and Mongolian blood. His parentage was of the lowly priesthood of the Greek church. His father secured his name of Mendeljeff from dealing in horses. His mother, however, belonged to a family in which was great initiative, for they introduced the manufacture of paper and glass into Siberia. His father died of consumption when Mendeljeff was twelve years old. The glass business on which they depended for a livelihood was destroyed by fire and his mother, with himself and his sister, left Siberia for Moscow. His education from this time on, owing to his own honest and hard work, was of the very best, finishing in Rengault's Laboratory in Paris and in Bunsen's in Heidelberg. At about twenty years of age, Pirogoff, the surgeon, passed the sentence of death upon him and sent him south suffering from consumption. He hated Latin and Greek and would never study them. His power of generalization was enormous, but most outstanding of all was his amazing industry. At the age of thirty-two he gave to the world his immortal paper, the foundation of the Mendeljeff Table "On the Relation of the Properties to the Atomic Weights of the Elements."

Mme. Curie, the most amazing woman of our time, the greatest woman scientist of all time, is specially interesting because we have the privilege of honoring her in America to-day. She created a new science of radio activity by the discovery of radium. She has opened the door to a new field broader than any other single one in the history of science. Her father was a doctor in the High School at Warsaw in Poland. Her mother died when she was very young, and this, added to life under Russian domination of Poland, brought little to her early life but misery. It gave her, however, one outlet in her father's laboratory, but soon she was robbed of even this comfort for, being entangled in the revolutionary spirit of the Poles against Russian oppression, she was forced to flee from her native land and took refuge in Paris. Here she lived on ten cents a day gathered from private tutoring. Later she obtained the position of bottle washer at the Sorbonne. From washing bottles she advanced to setting up apparatus and thus came to the notice of Poincare, a brother of the former French president. From this time on through her work with, and marriage to, Pierre Curie, her genius has shone undimmed. For the mothers of to-day who complain of the burden of children, it may be said that Mme. Curie, either because or in spite of her two daughters, has reached her present position. Opportunity would seem to have been impossible for her but she created it.

Finally we come to the greatest chemical investigator probably of all time—Emil Fischer, who has recently died. He was born in the lap of luxury in Prussia, with its too perfect system of instruction, and received an education that could not be surpassed. He came in contact with great teachers, Van't Hoff, Baeyer, and Hoffman; equipment and opportunity never before provided to one man were his. With great power of generalization he approached the analysis of the three great groups of animal food; fats, carbohydrates, and proteins. The construction of two of these groups, carbohydrates and proteins, by labor at both ends, analysis and synthesis, he has practically solved, carrying us farther on our journey in the inscrutable fields than any other single man. New methods were the weapons of this attack.

From these few examples it is obvious that we

can fix upon no common factors unless they be memory and ability to devise new methods, but even these we cannot produce at will. It is therefore unlikely that we can at an early date produce the complete researcher without whom research is impossible.

This need not deter us in our program of universal education, nor in our research for better methods of education, nor in our attempts to produce more qualified persons in this field of work.

But there is another angle of approach and assistance for us. In addition to our union for democratic governmental purposes, we have bound ourselves in a great series of voluntary unions for the avowed purpose of helping on the welfare of mankind as well as ourselves. No age has seen such a growth of national and provincial state societies as ours. Such voluntary bodies have all the freedom of action which government unions lack, but they only begin to realize what can be accomplished if only a percentage of all their funds be devoted to the stimulation of search for new knowledge--ten percent. probably; that portion which the Jewish prophets called their gift to the Lord.

Our governments have in many instances established research laboratories, but they still travel in the old belief that they need only appropriate funds and say, "Let there be Research." It does not follow with such an Aladdin touch. A search through the brilliant periods of history does, however, suggest a way for the recognition and subsidy of genius when it appears. The method of the renaissance of Italy, France and England. The method of Lorenzo de Medici, the Magnificent of Florence.

As an example of what I mean, the National Tuberculosis Association of the United States last year appropriated twenty thousand dollars, about one-tenth of its income, and appointed a small committee to expend it on medical research. Of this committee I have the honour of being chairman, the other two members are Dr. Allen K. Krause of the Johns Hopkins Hospital, and Dr. Paul A. Lewis of the Phipps Institute of the University of Pennsylvania.

After careful study, this Committee decided to follow the method of the Renaissance, even though they were possessed of neither court nor great wealth. At least they could make small appropriations to those whom the National Association recognized as worthy of assistance, small appropriations to be used for new assistants or for materials with which to work. They could signify to the university or laboratory in which a recognized research scholar was working that in the opinion of the National Association the work which the chosen men were doing reached the grade of national recognition. They could thus hope to stimulate the spirit of the student life from which must come, in the main, our research workers. They could in time repay with greater freedom, those who devoted their lives to increasing the sum of human knowledge.

Our first year of work has passed. We recognized two men: one a man of over fifty, Dr. William Snow Miller of the University of Wisconsin, whose life long work has been devoted to the study of the lymphatics of the human lung. He has much unpublished work of value to the human race, and his studies underly our knowledge of the spread of tuberculosis infection as well as our interpretation of X-ray plates on which we base so many opinions in diagnosis to-day.

The second man is Dr. Esmond R. Lond of the University of Chicago, who has undertaken to solve the fundamental problems of nutrition of the tubercle bacillus. In the media on which his organisms grow he permits only one method by which the bacillus may secure its nitrogen, and thus by elimination he has been able to find the method of election of each group. I need not describe further his work to you. His paper will be prepared and read before our Association in June in New York as will also the paper of Dr. William Snow Miller.

I hand on the suggestion of this our adopted method revived from the past, to you—one of the great voluntary organizations of Canada—in the hope that its motive may spread. It seems to me that with the initiative coming from great volunteer organizations there may be established some preventive to keep governments from being lulled to sleep by the burdensome character of their machinery, and that by the very freedom of action of these volunteer bodies there may be stimulated in our university student bodies the quest for paths in the unknown fields, and, in the teachers, the spirit to develop in contact with the students, that unknown something which may bring us year after year the creativeness that made the glory of the Renaissance.

I consider it a great honor to have been here, associated with my friend, your president, Dr. Mullin, and I trust I have not burdened you with too tedious a discourse.

ENCEPHALITIS LETHARGICA

A. Armour Robertson, M.D.

Lecturer in Medicine and Clinical Medicine, McGill University, Montreal

I HAVE no intention of giving a dissertation on this subject, but thought it might be interesting if I reported the cases which have been thus diagnosed in the Montreal General Hospital up to the present time. There has been no epidemic, but these cases have been occurring sporadically, the first being in October, 1919.

As has been often noted there are no pathognomonic signs or sypmtoms, and probably the only cases about which there can be absolutely no dispute are those in which the lesions are demonstrated on the autopsy table.

Fortunately this is not always possible as many recover, so that each case has to be judged by itself, and the diagnosis is made rather by exclusion of other causes for the nervous symptoms present than positively by the presence of any definite symptoms or signs.

Of course, in cases where there is a febrile onset with headache, delirium of an occupational character, transitory diplopia, paralysis or paresis of some limb or limbs, with possibly a cerebro-spinal fluid under pressure and containing an increased number of cells, the diagnosis is not difficult, but it is the atypical and often less severe cases which give room for discussion and doubt, so that in some cases diagnosis may rest on reasons not much if any more conclusive than, "If it is not that, what is it?"

There have been under treatment in the hospital fourteen cases of which four have died. In all these cases, except one which will be mentioned, syphilis was excluded, the Wassermann reaction being absent in both blood and spinal fluid. In some cases the cerebro-spinal fluid was under pressure, in some not. In most there was a varying degree of increase of cells, but even with an increase in the number of cells, the globulin reactions were at times absent. In some the blood showed moderate leucocytosis, in some none.

Of the four fatal cases two were the first cases of this disease known to have been admitted to the hospital. Both of these cases were foreigners though living in Canada for some time, one being an Austrian, the other an Italian.

The former was admitted almost moribund and died the same day. He showed marked external strabismus and paralysis of the seventh nerve and left arm. His pupils were unequal and inactive. His cerebro-spinal fluid was turbid and gave the highest cell count recorded, 510 per cubic millimetre. His temperature rose before death to 105-2/5. This was the most acute case noted as the illness apparently only lasted eight days.

In the second case recorded the disease ran a more chronic course, that is of about three weeks from the time he left off work, but he gave a history of increasing headache for about two months before this time and of increasing drowsiness. These symptoms with delirium, retention of urine and diminished sensation over the whole body, except the face, were the most marked during the course of the disease, and a notable feature was that it was only a day before death that any weakness of the cranial nerves was noted: at that time there was a divergent squint and the left side of the face seemed paretic. At first the only pathological reflex was a slight Oppenheim on the right, but later the knee jerks disappeared and there was a slight Babinski on the right side. There was a very high antemortem temperature, 108-2/5. The cells in the cerebro-spinal fluid were increased at the three counts made (70 to 162), but at first the globulin tests were negative.

In both these cases the brain showed oedema and sections showed collars of lymphocytes around the blood vessels and lymphatic infiltration of the pia-arachnoid.

A third fatal case was in a woman aged 47. In her case the most marked signs, loss of sensation over the whole body with general weakness of all limbs, though no paralysis existed. The

pupils were unequal and reacted sluggishly to light. She died rather suddenly and no autopsy could be obtained.

The fourth fatal case was the only case in this series in which syphilis was shown to be present: his blood gave a strongly positive reaction. This was also the only case in this series in which there were marked choreiform movements present. These movements formed a prominent feature in his symptoms. He was restless and irrational rather than lethargic. In this case there was a history of double vision before admission, but no inequality of eye movements were noted during his stay in the hospital.

As this case is being considered by Dr. A. H. Gordon in his paper at this meeting, I will not mention it further.

Of the non-fatal cases two were cases of the more typical symptomatology, but of less severe grade and both made almost perfect recoveries before leaving hospital. In one the diagnosis was obscured at first by a history of previous syphilis, but Wassermann tests on blood and cerebro-spinal fluid were negative and he recovered without any antisyphilitic treatment.

Another case was in a member of the medical profession and showed onset with general symptoms of gastro-intestinal disturbance of diarrhaea and intestinal pain followed by constipation. He entered the hospital about ten days after the onset of the disturbance with fever of 101, rising the next day to 102. This fever gradually subsided but there was more or less fever for about two weeks. He showed much drowsiness and delirium of an occupational character, answering telephone, giving anaesthetic, etc.

In this case the localizing symptoms were principally referred to the legs, especially the left leg. There was great complaint of pain at the onset in the left thigh, especially the lower third, coming on in very severe spasms, comparable to lightning pains. There was a point of extreme tenderness just above the inner condyle. X-ray of this leg was quite negative. The motor signs never amounted to paralysis, nor was there any wasting of the muscles, but the left knee jerk was diminished and the left cremasteris could not be elicited. There was no ataxia in heel to knee test.

He made a good recovery.

There have been two cases ascribed to this disease in the hospital in each of which there was hemiplegia associated with bloody cerebro-spinal fluid. Both of these cases were in healthy young girls, one of 16, the other 14 years old. In both search for other conditions which could cause such haemorrhage were negative. One of these cases had a right sided hemiplegia with transient aphasia, the other a left sided hemiplegia with sensory loss over the affected side. In both the hemiplegia was complete with hypertonus and pathological reflexes. This condition gradually improved so that when they left the hospital there was practically no paresis present in either case.

One of these cases showed slight optic neuritis more marked on the side of the central lesion.

The other case showed on one occasion bilateral clonic spasm of the facial muscles lasting two or three minutes. This was not accompanied by loss of consciousness but was apparently not recognized by the patient.

There has been one case of the disease apparently affecting principally the pontine region. This man after almost a month of digestive disturbance with vomiting and nausea, noticed burning sensation in the fingers and toes more marked on the right than the left side. He had headache but at no time showed abnormal drowsiness nor did he have any sensation of fever.

On admission three or four days after onset of weakness he showed paralysis of the left side of the face and paresis of the right side of the body. His tongue was protruded to the right. His blood pressure was 134 to 80. His glands were generally palpable and his spleen was palpable three finger breadths below the costal margin. He still had subjective sensation of tingling in the fingers and toes, but objectively there was no change. Both arms and legs showed marked general weakness and he was only able to walk with help and was ataxic. Ataxia was also present in the arms. At first Rhomberg could not be tested as he was unable to stand but later it was positive and he fell forward. His epigastric and abdominal reflexes were absent and also his knee jerks, but there were no positive abnormal reflexes. Later he developed diplopia and a weakness of the left external rectus was noted. Kernig's sign became positive, more marked on the right side. He developed slight nystagmus on looking to the left. He gradually recovered and left the hospital with only very slight signs of ataxia. His knee jerks were still diminished. His cerebro-spinal fluid never showed any increase

of cells and of the globulin tests the only one positive was Pandy.

Diagnosis was made on the history of gradual development of paresis and ataxia with practically complete recovery in the absence of any other cause discoverable for such an affection in the patient.

One man, aged 50, presented himself with complete paralysis of both facial nerves which had lead to marked conjunctivitis in both eyes. His face was completely mask like. The ears were examined and disclosed no cause for the facial paralysis. This paralysis had commenced about two weeks before admission. One month before admission he had had shooting pains in both legs and cramps in the soles of the feet and at about the same time he stated that he had had transitory diplopia. During his stay in the hospital at first the temperature was irregular, reaching 100 as the highest but usually reaching 99 every day until shortly before discharge. He showed some drowsiness but few general symptoms.

His abdominal epigastric, and cremasteric reflexes were absent at admission and there was a doubtful Oppenheim, but no other abnormal reflexes.

He made a practically complete recovery being in hospital about five weeks.

His cerebro-spinal fluid was not under pressure: it contained 41 cells per c.m.m. but globulin tests were negative. Wassermann was, of course, negative. There was no leucocytosis.

One patient, a woman of 28, was admitted in March, 1921, giving a long history and is apparently a chronic case.

The symptoms began rather acutely about fifteen months before admission. From that time she had been more or less ill, at times showing drowsiness, at others sleeplessness. Her movements had become slow as if her mind was on something else. She did not care to talk unless answering questions.

On admission she showed this mental sluggishness. Her pupils were inactive to light. Her abdominal reflexes were absent on the right side and there was a Babinski reflex on the left. She showed no improvement while in the hospital.

Two cases have shown the presence of glycosuria without the history of such condition being present before. However in one case there was a history that for two years he had suffered at times from blurred vision, headache, and a feeling of general weakness. These attacks would last for a varying period from a day to two weeks. In the intervals he felt well, but he had frequency of micturition and constipation with some itching of the skin during the two years.

About two weeks before admission he began to suffer from pains in the back of the head and in the shoulders, shooting in character and more or less constant. During the following week he noticed that he felt weak, was easily tired and had blurred vision. The headache was more or less constant and increasing and he was in bed for about a week before coming to the hospital. There was an *indefinite* history of diplopia as he stated that he only noticed it when he wore glasses. On admission he was very drowsy at first, but examination of the blood chemistry showed no evidence that this drowsiness was due to diabetic coma. In fact he was put on diabetic orders and the urine remained sugar free after the first day in the hospital, but examination of the blood showed delayed assimilation of, and diminished tolerance for, glucose.

Lumbar puncture showed the fluid under pressure with 19 cells to the cub. m.m. and Pandy test positive.

In the other case there were more definite signs of encephalitis. The onset was more acute. He became rather suddenly ill about twelve days before admission with pains all over the body and a chilly feeling. These symptoms caused him to go to bed the next day and stay there for two days. After that he had a day when he felt well and was able to work. The next day on awakening he had double vision. This persisted for two days but without headache, though he vomited once. Following the disappearance of the diplopia he noticed dimness of vision.

On admission he seemed heavy and drowsy with slow mental coordination, but no distress. His pupils were equal, small and active to light and accommodation. There was no weakness of any extra-ocular muscle. His tongue was thinly furred and his breath heavy. His blood pressure was 138 to 94.

On examination of the nervous system nothing abnormal was found in the cranial nerves except possibly the second in that he complained of blurring of vision, but the fundi were normal. There was no paralysis or paresis of any muscle found. The knee jerks were accentuated, and abdominal reflexes diminished. The right cre-

masteric was greater than the left. No pathological reflexes were found and there was no retraction of the head.

The next day he was more drowsy and some ptosis was noticed in both eyes. This increased on the next day and it was noticed that the right eye could be rolled up towards the forehead, but the left eye continued to look straight forward. No other paralysis or paresis was found.

He ran a rather acute course. He was irrational a good part of the time for about a month after admission but could be roused. Delirium was distinctly occupational in character. He had almost daily incontinence of urine and at times faeces.

Almost a month after admission he had three attacks in which he had spasm of all the muscles of the body but no opisthotonus. These attacks started with a cry and frothing at the mouth. His tongue was not bitten but in one he passed urine. He remained very drowsy and stuperose after these attacks but no pathological reflexes were present.

After this he gradually improved and he left the hospital about seven weeks after admission without symptoms.

His temperature was elevated for almost a month after admission usually reaching 101 to 102, but on one occasion reaching 103.4. It ended by slow lysis.

In this case sugar first appeared in the urine 16 days after admission when he was acutely ill and it persisted off and on for about eleven days.

From the absence of previous history pointing to diabetes and the occurrence of the sugar only late in the disease while other acute symptoms were present this was regarded as a case of glycosuria due to extension of the process into the fourth ventricle, while in the first case as there was a history of symptoms suggesting previous glycosuria it was considered that that case was one of encephalitis occurring in a man predisposed to diabetes.

These cases have been followed in the metabolic clinic of the hospital since discharge and their subsequent history confirms this view as the first case shows a persistence of diminished tolerance to glucose and delayed assimilation while in the second case these have practically become normal.

These cases are offered, not as presenting anything new, but simply as cases illustrating the complexity of the problem due to the divergence of the symptoms met with in this disease on account of its apparently greatly varying severity in different cases and also to the fact that different parts of the central nervous system are called on to bear the brunt of the infection in different cases.

No specific treatment was used in any of these cases so that the results can only be ascribed to symptomatic and expectant treatment.

I have to offer my thanks to the medical staff of the hospital, especially to Drs. F. G. Finley, H. A. Lafleur and A. H. Gordon, for permission freely given to use the records in cases under their care.

The American Public Health Association announces four phases of its semi-centennial celebrations to be held in New York City, November 8-18, 1921:

(a) *The Scientific Sessions* will be held November 14-18. There will be programs of the following sections: Laboratory, Vital Statistics, Public Health Administration, Sanitary Engineering, Industrial Hygiene, Food and Drugs. There will also be special programs on Child Hygiene and Health Education and Publicity.

(b) *Health Institute*, November 8-12. The purpose will be to show health functions in actual operation, especially those which may be duplicated in other cities. In one sense the Health Institute may be considered as a school of instruction in practical health administration.

(c) *Dr. Stephen Smith*, the founder and first president of the Association, who is now in his 99th year, will be the guest of honor at a banquet to celebrate his approaching centennial and the semi-centennial of the Association.

(d) *A Historical Jubilee Volume*, "Fifty Years of Public Health," will be published about October 1. While concentrating upon the public health of the last fifty years, the book will describe the earlier beginnings of public health in an introductory way, and may, therefore, be considered a general history of public health from the earliest days to the present.

Detailed announcements, programs, and information concerning special railroad rates will appear in the *American Journal of Public Health* and the *News Letter* of the Association from time to time or may be had upon addressing the Association at 370 Seventh Avenue, New York City.

Retrospect.

ON THE CAUSE AND TREATMENT OF RICKETS.

H. B. Cushing, B.A., M.D.

Lecturer in Medicine and Clinical Medicine and Pediatrics, McGill University, Montreal.

FOR many years the question as to the real cause of rickets, and as a sequence, the best treatment of the disease, has been in dispute. There has accumulated an abundant literature on the subject and medical opinion has veered between two main views, one that rickets is due to a defect in the diet, and the other that the main factor was defective hygiene, with occasional isolated observers blaming bacteria and the endocrine system.[1]

The recent important discovery of the vitamines with the associated explanation of the cause of beri-beri and scurvy has caused a revival of interest in the etiology of rickets and a large number of articles have been published in the last two years, based on animal experimentation, clinical observation, and chemical investigations. In spite of all this the solution of the problem seems to be still unsettled, and this disease, which is one of the commonest in the civilized world, with its far-reaching results due to the great loss of life in childhood, and to the production of deformity and weakness in later life remains a puzzle. It is curious that we can easily produce the disease in laboratory animals, and equally easily prevent or cure it, but the main cause remains unknown.

Two factors have always complicated the results: first, there is no known pathognomonic sign of the disease; although few diseases are so characteristic and so easily recognized in typical cases, scientists have never agreed on any definite criterion for doubtful cases; hence the periodic discussion on the existence or otherwise of foetal rickets and of adult rickets. Secondly, the disease seems self-limited, occurs chiefly between the ages of 6 and 15 months and all patients spontaneously improve if they survive, so that it is difficult to estimate accurately the therapeutic value of any one method of treatment.

The revival of interest in the cause of rickets is largely due to the work of Mellanby[2], who from experiments on dogs claimed to have proved that the fat-soluble vitamine, or one closely resembling it and with a similar distribution, was the paramount factor. His results were accepted by the Medical Research Committee of Great Britain[4] and widely adopted. The effect of recent studies, however, has been to negative this idea. It has been shown by many observers that various young animals fed on a diet free of the fat-soluble vitamine became emaciated and ceased growing, but at autopsy showed no rickets.[5]

Chemical studies have been many and interesting, if more or less barren of definite results. Sherman and Pappenheimer[6] showed that in rats rickets uniformly appeared in the absence of, and was uniformly prevented by the presence of phosphates in the diet. Howland and Kramer[7] have shown that the calcium content of the serum of children is remarkably constant and although during active rickets the calcium content may be slightly reduced, this seems to depend less on rickets that on a concomitant tetany. On the other hand the inorganic phosphorus of the serum is stated to be regularly reduced in active rickets, sometimes to an extreme degree. This may prove to be a valuable test for rickets and a measure of the improvement under treatment.

From the failure to establish a definite dietetic cause the hygienic theory of etiology has become more prominent. The greater prevalence of acute rickets in the winter and spring months has been acknowledged since the work of Schmorl.[3] Hess[9] argues from this that sunlight is of dominant importance in the etiology and advises treatment with ultra-violet rays. Leonard Findlay [10] of Glasgow from clinical observations claims that the chief factors in the

production of the disease were overcrowding in the home and insufficient exercise in the open air. J. Lawson Dick[11] states that deficiency of food and errors in dieting will aggravate rickets, but no diet, however efficient will prevent rickets if the child is brought up under slum conditions. Paton and others [12]claim that experiments on pups show that exercise and an open-air life are the most important factors in the prevention of rickets.

Turning for a moment to the treatment of rickets we find the time honoured treatment with cod-liver oil still holds its place, although the manner of its action is still in dispute.[13] Some have ascribed its action to the vitamines present, others to the fact that cod-liver oil alters the calcium balance in such a manner that calcium will be retained in the body. The value or otherwise of the addition of phosphorus is still in debate. Alan Brown[14] and others in a recent article in this Journal argue strongly against it on clinical observations.

A recent advance of great importance in the study of the disease has been the utilization of the x-ray for observations on the long bones as a measure of the effect of various treatment.[15]

One redeeming feature in the whole controversy from the practical point of view of the average practitioner is that none of the methods of prevention or treatment of rickets as advocated are difficult, costly, or dangerous. So that probably the general practitioner will continue to advocate a mixed diet containing vitamines, with fresh air, sunlight and exercise, and with the use of cod-liver oil and perhaps phosphorus, and wait patiently for scientists to settle which of these agents is accomplishing the work.

1. Corominus: *Arch. Españde Ped.*, April, 1919.
2. Léri and Beck.—*Ann. de Méd.*, Jan., 1920.
3. Mellanby, E.—*Lancet*, March 15th, 1919.
4. National Health Insurance, Medical Research Committee, Special Report Series No. 38, London, 1919.
5. MacKay, H. M. M.—*Biochem. Jour.*, 15:19, 1921.
6. Sherman and Pappenheimer—.*Prov. Soc. Exper. Biol. and Med.*, March, 1921.
7. Howland, J. and Kramer, B.—*Amer. Jour. of Dis. Child.*, August, 1921.
8. Schmorl.—*Ergebn. d. inn. Med. und Kinderh.* 4:403, 1909.
9. Hess, A. F.—*Amer. Journ. of Dis. Child.*, August, 1921.
10. Findlay, L.—*Glasgow Med. Jour*, May, 1918.
11. Dick, J. L.—*Defective Housing and the Growth of Children*, London.
12. Paton, D. N., and Watson, A.—*Brit. Jour. Exper. Path.*, April, 1921.
13. *J. Biol. Chem.*, Jan., 1921.
14. Brown, Allan.—*Can. Med. Assoc. Jour.*, Aug. 1921.
15. Park and Howland.—*Arch. Pediat.*, 37:411, 1920.

A SCIENTIFIC ACCOMPLISHMENT

Remarkable advances have been made in the study of blood-clotting and hemorrhage during recent years. Not only have we learned much of a practical nature concerning the "mechanism" of blood coagulation, but we have also discovered means to control even inaccessible bleeding when, as is often the case, it fails to cease spontaneously, due to defective coagulability of the blood.

The blood is kept in a fluid state in the vessels by the presence therein of antithrombin. Should the proportion of antithrombin be unduly increased and a hemorrhage occur, the blood would fail to clot. The absence or insufficiency of prothrombin or kinase, which perform an important part in the process of coagulation, would have a similar effect. Hence in the treatment of uncontrollable hemorrhage the physician needs an agent that can be depended upon to meet both of these conditions. Such a substance is Hemostatic Serum, P.D. & Co., a comparatively recent addition to the list of highly scientific remedies that have been elaborated by experts in physiologic chemistry. Hemostatic Serum neutralizes antithrombin and supplies prothrombin and kinase. Its effect is truly remarkable in the treatment of capillary hemorrhage, hemorrhage of the new-born, pulmonary hemorrhage, persistent epistaxis, bleeding from gastric and intestinal ulcers, hemorrhage following surgical operations upon the tonsils, the bones or the viscera, and so on. It is administered hypodermically or intravenously in doses of 2 to 5 cc., and the dose may be repeated at intervals of two to six hours. It is also used to prevent hemorrhage by administration prior to surgical procedure in hemophiliacs. To be prepared for any emergency the surgeon should include a package of Hemostatic Serum in his equipment, as the product keeps well and is always ready for immediate use.

Case Reports

THREE UNUSUAL ABDOMINAL TUMOURS.

H. H. McNALLY

Fredericton

Case 1. Sarcoma of Kidney.

Female, aged 18 months, referred by Dr. D. W. Ross who had attended at the birth and throughout the life of the patient.

The child's life had been normal during the first few months but toward the end of the first year it became worrisome and frequently seemed to be in distress. When seventeen months old a mass was noticed in the right hypochondrium which rapidly increased in size and filled the right half of the abdomen, extending to mid-line with the lower border at the level of the iliac spine. The tumour had a firm resistent feel and was only slightly tender. From x-ray examination it appeared to be attached to the ascending colon. The urine was markedly bloody at times. Bowels were constipated. The general condition was that of an anaemic child, otherwise negative.

On June 24th, 1921, the abdomen was entered by incision over the mass. The peritoneal cavity contained free fluid in small quantity and of clear colour. The ascending colon lay over the anterior surface of the tumour. The parietal peritoneum was incised lateral to the ascending colon and a line of cleavage between tumour and lateral abdominal wall was chosen. Blunt dissection permitted the tumour to be peeled from its bed and rolled medially out of the incision, exposing ureter and renal pedicle, which were ligated and divided. Bleeding was controlled by hot pack and a few points of ligature. The abdominal wall was closed in layers without drainage. Shock was extreme but was relieved by hypodermoclysis.

Time consumed in operation, twenty-three minutes.

Convalescence was rapid and at date of writing four weeks after operation, the child is apparently normal.

Dr. Crowdy of the Royal Victoria Hospital Pathological Department reports on the specimen as follows: "The specimen consists of a pole and part of the body of a small kidney, the remainder having been destroyed and replaced by a malignant growth, partly necrotic.

Microscopic sections show a characteristic tumour growth consisting of masses of deeply staining oval or slightly spindle shaped cells with little protoplasm and richly chromatic nuclei, supported by an alveolar like connective tissue stroma. The kidney tissue is markedly inflamed and shows hyaline and cellular casts.

Pathological diagnosis: Sarcoma with secondary infection of remaining kidney substance.

Case 2. Myoma of Bladder Wall.

Male, aged 54; farmer, complains of frequency of urination (10 minutes) not relieved by passage of catheter; and of great pain in lower abdomen and down the thighs; also of inability to sit with comfort or to stand erect.

Present illness dates back two years, at which time he first noticed discomfort at end of spine when riding horse-back, soon followed by inability to stand erect without pain. About a year ago there was retention of urine for which he had hospital treatment for a few weeks.

Past history is negative; no acute illness; habits good.

Present Condition: Chest normal, digestion good.

Blood Pressure: systolic 150; good pulse pressure. Slight leucocytosis; Wassermann negative. Urinalysis: Sp. gr. 1020—acid—no albumen, no sugar. Rectal examination reveals an abnormally large prostate, uniformly round.

On April 19th, 1921, suprapubic cystotomy was performed. Bladder cavity healthy and contracted. Bladder closed and peritoneal cavity opened to left of bladder where a tumour

was located the size of a child's head and completely filling the pelvic cavity. The left ureter was much enlarged and crossed on the anterior surface of the tumour, it was lifted out of the wound. The iliac vessels apparently traversed the tumour.

At the pelvic brim, posteriorly and in midline, the capsule of the mass was incised and the tumour removed piece-meal. The cavity was drained by rubber tube through abdominal incision. Wound closed in three weeks. Bladder now empties normally; the bowels move freely; the patient is free from pain, can stand erect and can remain in bed throughout the night.

Total weight of tumour pieces removed, one and one-eighth pounds.

Pathological report by Dr. Crowdy, Royal Victoria Hospital: Microscopic sections show tumour tissue made up of a fairly uniform type of cell, with oval or elongated nucleus and protoplasm tending to be fibrillar. While they are evidently young cells and have the appearance and arrangement of embryonic smooth muscle they do not show any evidence of malignancy. Scattered well formed blood vessels complete the picture.

Diagnosis—Myoma. The relation to the bladder and prostate and the size of tumour would seem to indicate that it is a subserous myoma growing from bladder wall.

Case 3. Blood cyst connected with kidney.

Male, aged 26; farmer and lumberman, had from boyhood suffered from vomiting attacks, but when he first noticed enlargement of the abdomen seven years prior to coming under observation these gastric attacks had been lessening. About one year before abdomen began to increase in size he had suffered injury to the *right* loin by a falling tree.

Present Condition:—Weight 145 lbs., height 5 ft. 7 ins., of large frame, pale and somewhat thin. Haemoglobin 50%, no alteration in erythrocytes, Wassermann negative. Urinalysis: Sp. Gr. 1020; no sugar; no albumen, no casts. Slight oedema of lower extremities. Chest negative. The abdomen is much enlarged and distended and patient cannot lie on back because of discomfort and back-ache.

Abdomen opened June 21st, 1921, revealing a cystic tumour which had displaced all viscera from about the incision. Extensive adhesions prevented exploration of the abdominal cavity. Tumour was tapped and two quarts of blackish fluid removed. The thickness of the wall prevented collapse, therefore an incision was made to permit entry of hand into the tumour cavity and the removal of large masses of pultaceous material having the appearance of dirty raw cotton. Still the walls would not collapse because of the binding adhesions. By blunt and sharp dissection the tumour mass was separated from the overlying peritoneum, and from its bed posteriorly (many large vessels requiring ligature) until its attachment was recognized as being the pedicle of the *left* kidney. Tying and dividing this liberated the mass. The patient made an uneventful recovery and was discharged from hospital in three weeks.

Pathological examination: Dr. Crowdy, Royal Victoria Hospital.

The specimen as received consists of a large cystic sac, said at the time of operation to contain dark fluid which looked like bile (a specimen of this fluid received; see examination below), and a lobated mass of firm tissue, which on section shows well-formed kidney parenchyma. After extensive dissection and removal of adherent fibrous and fat tissue the following structures and relations were made out:

A large cystic sac the size of a man's head which bears a very intimate relation to the pelvis of a kidney. The contents were evidently largely fluid and had been removed, but the inner wall is still lined with a shaggy coat of fibrin and blood clot which can be easily removed. The sac is partly divided into two approximately equal parts by an incomplete septum, which shows a peripheral circular orifice 2 inches in diameter. The wall of one division of the sac is ½ inch in thickness and shows a distinct laminated structure, is very firm, tough and hyaline in appearance. The wall of the other division of the sac is only ⅛ inch thick and much more pliable and membraneous like in structure. In the course of the dissection another mass of kidney tissue approximately the size of the detached portion was disclosed in intimate relation to the wall of the thinner sac. In fact the removed piece of kidney evidently had an equally intimate relation to the sac as the bed from which it had been removed is plainly visible. If this portion of kidney is replaced in position it is so situated as to lie in the relation of one pole of the kidney to the other and moreover these two parts were connected by a thin bridge of kidney substance. The pelvis was found lying between the flattened kidney substance and

the thin sac wall and is intact. The ureter had been sectioned and ligated close to the pelvis. Section of the pelvis showed that its lumen did not connect with the lumen of the cystic sac.

Examination of the fluid sent in a separate bottle gave the following results: Bile test, negative. Blood test, positive.

Microscopic Examination

Diagnosis: The dissection of the gross specimen and the microscopic picture all point to the gradual development of a haematoma beginning in very close relation to the pelvis of the kidney, gradually expanding and flattening the kidney on its surface. The vessels involved was probably one of the smaller renal branches possibly even after it had entered the kidney substance. It is impossible, of course, now, to demonstrate the actual site of rupture or the exact cause. There are two possibilities, trauma and disease-syphilis and arterio-sclerosis from the history and age are apparently excluded, as also is malignant growth because of the absence of metastasis. This leaves trauma, the most probable factor, and of which there is a definite history.

ABSORPTION THROUGH GENITO-URINARY ORGANS

The genito-urinary passages and organs are frequently the seat of the application of potent substances for either diagnostic, therapeutic or other less justifiable reasons. A knowledge of the absorptive functions of the various regions, notably the urethra, the urinary bladder, the ureter, the pelvis of the kidney, and the vagina is obviously important, not only to determine to what extent drugs may behave efficaciously in any of these localities, but also to appreciate the degree of possibility for the transfer of potent substances through the blood stream to all parts of the body. Every one realizes how profoundly absorption from the rectum may affect the organism as a whole. To what extent the genito-urinary lining membranes may facilitate the entrance of either beneficial or baneful products is not equally well understood, although the inefficiency of the urinary bladder as an organ of absorption has been emphasized frequently. Under the auspices of the Therapeutic Research Committee of the Council on Pharmacy and Chemistry of the American Medical Association, Macht of Johns Hopkins University has investigated the behaviour of the genito-urinary organs towards a special group of drugs—local anesthetics—applied directly to various surfaces within these structures. The outcome of Macht's studies is the demonstration, alike of scientific and practical interest, that local anesthetics like cocain and its analogues are easily absorbed through the various organs of the genito-urinary tract, with the exception of the bladder. The contrast between the behaviour of this organ and the adjacent urethra is as marked as the analogous dissimilarity between the stomach and adjacent duodenal membranes. Macht urges that although the absorption of cocain, for example, through the ureter and pelvis of the kidney may seem to be chiefly of academic interest, yet in view of the modern use of such drugs as the iodids and thorium in these structures, the subject may become of practical importance. The demonstration of rapid systemic absorption of drugs from the vagina serves to reemphasize the often unsuspected dangers that lie in careless and unwarranted irrigations of its passages with potent solutions as well as by other means which may expose the surfaces to soluble products. The mention of mercuric chlorid, phenol and cresols will at once awaken relevant thoughts. Entirely new, so far as we are aware, is Macht's demonstration of rapid absorption through the prepuce. This is significant from the surgical standpoint, as local anesthetics are widely employed in application through the prepuce, so that careless or excessive use may actually lead to toxic symptoms in patients.—Editorial, *Jour. A.M.A.*, March, Vol. 76, No. 10.

Editorial

BASAL METABOLISM AND GOITRE

THE solid achievements in metabolic research and the widening field of the clinical application of metabolic methods are forcibly displayed in the series of able papers included in the Symposium on Metabolism at the June meeting at Boston of the American Medical Association. (*Jour. A.M.A. Vol. lxxvii. No. 4.*)

Probably of chief philosophical interest is the paper by Dr. Plummer, reflecting, as it does, a vast experience in the clinical field. It is a brilliant exposition of the factors which appear to be fixed truths, with here and there a mild indulgence in philosophical speculation which should prove stimulating to other workers.

Among the ascertained facts which have clearly emerged within the past year are:

(1) The effect of thyroxin administration upon the colloid goitre of adolescence. In the past these cases have fallen between two stools. On the one hand, because of a normal basal metabolism, an operation is contra-indicated; while, on the other, the medical remedies generally prescribed are innocuous; even the administration of thyroid gland by mouth having an extremely variable effect. The intravenous administration of thyroxin, however, leads to a rapid shrinking of the goitre, without producing untoward constitutional symptoms.

(2) The development of secondary hypothyroidism or a disuse atrophy, in individuals who have been subjected to prolonged starvation. These cases promptly develop signs of myxoedema on an increased diet. One has here evidently a manifestation of the law of the Conservation of Energy; an attempt on the part of the organism to adjust the total metabolism to the level of the lowered food intake. Once again thyroxin has proved a specific therapeutic agent.

(3) The necessity for defining clearly the difference between (a) the varying degrees of thyroid activity under rest and stress; (b) the varying degrees of thyroidization of the tissues due to fluctuations in the total metabolism; and (c) hyperthyroidism due to pathological conditions, such as exophthalmic goitre and toxic adenoma.

(4) The clear-cut differentiation between the three main pathological conditions met with in the thyroid, namely, (a) pure hyperthyroidism due to hyperactivity in postnatal adenomata, the removal of which invariably restores the basal metabolic rate to normal; (b) pure hypothyroidism (myxoedema); and (c) exophthalmic goitre, the status of which can not be wholly attributed to an excess of the normal thyroid secretion. In this latter connection Plummer and Boothby have thrown out the suggestion that the unusual symptoms and clinical course of exophthalmic goitre may be due to some alteration in the construction of the thyroxin molecule.

To Benedict, laboratory workers are indebted for the development and simplification of a method of indirect calori-

metry, based upon oxygen consumption, which has proved most satisfactory in the investigation of thyroid conditions; while to E. F. DuBois and his associates is due the credit of having established a height-weight formula for estimating the surface area.

Of the other tests for hyperthyroidism, Boothby has been able to confirm the conclusions of Peabody, that there is no parallelism between the intensity of the epinephrin reaction and the degree of hyperthyroidism, as determined by the basal metabolic rate; further, that the so-called "positive" reaction is met in a large percentage of individuals not suffering from hyperthyroidism and even in patients with a subnormal basal metabolic rate.

Beyond the experience that it was more frequently met with in patients with hyperthyroidism than in those with hypothyroidism, Boothby has found the sugar tolerance test too variable to be of diagnostic value.

Means' graphic exposition of the results of treatment, by means of charts upon which are plotted the basal metabolic rate, pulse curve, weight variations, and partial or complete rest periods, should appeal to all readers. Among the illustrated cases, that which records the effect of over-irradiation in a case of exophthalmic goitre and the subsequent trend of the basal rate toward the myxoedemic level would appear to offer definite proof of the possibility of abolishing hyperthyroidism by means of the X-ray. If it be true that the X-ray is destined to play an important part in the treatment of hyperthyroidism, final judgment will be hastened by parallel observations as recorded in these charts.

It is timely that a word of caution should be sounded against the misuse of the various forms of metabolism apparatus now pressed upon the market. Stress should be laid upon the fact that the interpretation of results now far exceeds in complexity the actual laboratory technique, and no one should attempt to analyse or utilize the results of metabolic determinations who is not thoroughly conversant with the significance of respiratory metabolism.

ON THE DIAGNOSIS OF TUBERCULOSIS IN INFANCY

THE detection by the physician of the presence of tuberculous infection in infancy by clinical signs is always difficult until the disease appears in its advanced stages: *e.g.*, meningitis, peritonitis, or broncho-pneumonia. The incidence of tuberculosis at necropsy has been placed by Hamburger at 23 per cent. in babies one year old, and at 40 per cent. in babies two years old. Undoubtedly the incidence will vary much in different localities. In a recent paper Drs. Hunter Dunn and Cohen of Boston state that in 661 consecutive necropsies in children under two years of age performed in the Infants' Hospital in that city, 138 or 20 per cent. showed tuberculous lesions; a percentage which suggests how often even in America the presence of the disease is overlooked clinically. Hamburger divides tuberculosis into three stages, primary, secondary and tertiary. The primary stage he regards as represented by the primary lesion and the associated lymph-node involvement; the secondary stage by the lesions produced by the further invasion of the body by the tubercle bacillus; while the tertiary stage

is represented by the chronic destructive lesions such as the bone and joint tuberculosis of late childhood and the phthisis of adult life. In general, diagnosis is only made when the secondary stage has been reached. In the detection of early tuberculosis infection Dunn and Cohen emphasize the importance of the following methods of examination.

First, examination of the chest for signs of enlargement of the tracheo-bronchial lymph nodes. These signs are spinal dullness obtained below the level of the second or third dorsal vertebra, and the presence of the tracheal voice below the seventh cervical vertebra, and over the upper thoracic spine when the patient whispers. This enlargement may in a few cases be due to other conditions, but is strongly suggestive of tuberculous infection. When there are signs of consolidation of the neighbouring portion of the lung, these signs may be masked and caution must be employed.

Second, making use of the Von Pirquet test Drs. Dunn and Cohen think that in infants, reactions which might be designated as suspicious and doubtful in older children should be considered as positive. In their experience the reaction was negative in a fairly large proportion of infants under two years in which the diagnosis was afterwards confirmed; a lack of reaction which they attributed to the frequency with which marked atrophy or anaemia existed and prevented its development. A positive Von Pirquet in an infant under two years of age may be regarded as confirmative of tuberculous infection with very little chance of error.

Third, the securing of a roentgenogram of the chest was the diagnostic method which eventually proved in their clinic to be the one on which the greatest reliaance could be placed. Practice in interpreting the plates is essential. It is necessary to know what tuberculous lesions can be shown in a skiagram. Four lesions in the chest are characteristic of the tuberculosis of infancy. First, primary lesions in the lung; these as a rule are too small to be shown. Second, enlargement and caseation of the tracheo-bronchial lymph nodes; these according to Drs. Dunn and Cohen can be seen in the majority of roentgenograms as a definite and characteristic shadow at the hilus. The correctness of this statement, however, was seriously questioned by experienced observers at the last annual meeting of the National (American) Society for the study of Tuberculosis. Third, miliary tuberculosis in the lung which does not generally give indications in a skiagram of its presence, but may sometimes, owing to the formation of large conglomerate tubercles.

Fourth, tuberculous broncho-pneumonia, which invariably gives a shadow recognizable as pulmonary consolidation; but broncho-pneumonia may not always be of a tuberculous origin.

A positive Von Pirquet reaction is the only evidence available pointing to a primary intestinal infection, and the early diagnosis of this stage of the disease cannot be made unless either the Von Pirquet is positive or the physician finds tubercle bacilli in the stools; but primary intestinal tuberculosis is rare in comparison with the primary focus in the lung. If the Von Pirquet is positive, or even suspicious and if the roentgenogram shows a shadow of tracheo-bronchial lymph-node enlargement, a diagnosis of tuberculosis primary in the lung may be made with a fair degree of certainty. If the sole evidence is a positive or suspicious D'Espine's sign with spinal dullness, a probable diagnosis may be cautiously made. In regard to the prognosis of

infantile tuberculosis Drs. Dunn and Cohen consider that the disease may be arrested if the patient presents no evidence that the disease has passed beyond the primary stage, but in no case is the outlook good owing to the tendency to develop fatal secondary forms in the early years of life.

EFFECT OF TOBACCO SMOKING ON THE NERVOUS SYSTEM

AT the last meeting of the American Society for Pharmacology and Experimental Therapeutics, W. L. Mendenhall read a paper (Jour. Pharmacol. and Exp. Therap., Vol.. XVII, No. 4, p. 333) on the effects of tobacco on the sensory thresholds of smokers and non-smokers, detailing the results of a series of observations carried out at Dartmouth Medical School. The normal threshold of the person tested was first determined by the Martin method of quantitative faradic stimulation, and after twenty or thirty minutes smoking the threshold was again measured. The observations demonstrated that the effect of smoking as shown by variation in the threshold was conditional upon the state of the sensory mechanism of the individual at the time of observation. The average normal threshold of both smokers and non-smokers was about 180 B. units. If the individual's threshold was at or near normal, smoking effected little change. If his threshold was low, indicating high irritability (nervousness) then smoking raised the threshold and lowered irritability. If the individual's threshold was high, indicating a depressed sensory mechanism then smoking had a stimulating effect. The depressant action of smoking, however, was more marked than its stimulating effects. Control experiments were made in which the subject rested instead of smoking. The effect of resting upon the sensory threshold was to vary it in the same way as did smoking. If the subject was nervous or irritable (low threshold) resting tended to raise the threshold and bring it back toward the normal; on the other hand if the subject was depressed (high threshold) then rest tended to strengthen and to restore the normal. The effects appeared to be similar, but smoking differed from rest in that it was more effective for the time. The stimulating action of smoking when one is depressed and the soothing effect when one feels nervous or irritable is generally acknowledged and accounts for the widespread use of tobacco. Many of our readers will be glad to have this demonstration of the usefulness of the weed, a fact which up to the present has been doubted by many pharmacologists. Cushing places the psychical factor and rhythmical movement in smoking as important, and calls attention to the fact that few care to smoke in the dark.

ON THE VALUE OF CINCHOPHEN AND NEO-CINCHOPHEN AND NOVASPIRIN IN RHEUMATIC FEVER

CINCHOPHEN, and neo-cinchophen were introduced to the profession some years ago by a German firm, under the names of Atophan and Novatophan, and advertised as superior to the salicylates in the treatment of rheumatic fever, and as quite free from any toxic action on the heart, kidneys and nervous system. The action of these drugs has been recently tested by Prof. Hanzlik and

his assistants in the Pharmacological Laboratory of the Western Reserve University, (Jour. Amer. Med. Assoc., June 18, 1921, Vol. 76, No. 26.) Chemically cinchophen is phenyl-cinchoninic acid, and neo-cinchophen is the ethyl ester of its methyl derivative. Cinchophen is the more soluble of the two; and therefore more active but also more irritating and toxic. The result of Hanzlik's experiments do not warrant the statement that cinchophen in the dosage advocated offers any superiority over sodium salicylate. The action of both appears to be similar, and about equal in therapeutic value. Both may bring on symptoms of salicylism and renal irritation. Cinchophen may give rise to more epigastric pain than the corresponding dose of sodium salicylate. This pain was not so manifest after the use of neo-cinchophen in similar doses, but the latter appears to be distinctly less efficient than either sodium salicylate or cinchophen in the treatment of acute rheumatic fever. Novaspirin, another drug recommended for the same purpose, while giving rise to no tinnitus aurium or cardiac depression in the patients treated by it, was found by Hanzlik to be much weaker in therapeutic effects; a result due to the inadequate liberation of salicyl from novaspirin in the system.

ON THE VALUE OF IRON IN ANAEMIAS

IRON has been employed empirically in the treatment of anaemia for many centuries even before the element was known to be an important constituent of the red blood corpuscles. Its value has been frequently questioned. Its absorption in the inorganic state was at first denied. When proof of absorption in the duodenum was afforded by pharmacologists, its usefulness in supplying losses in the haemoglobin content way was questioned and from time to time its action has been explained in various ways. It is admitted by all that ordinary human dietaries contain sufficient of this element for the very small wastage that takes place in the body. Nevertheless no form of ailment is more frequently encountered by physicians than that in which for one reason or another the haemoglobin content is deficient and nutrition fails; in such conditions the value of the administration of iron in some of its simpler preparations has been thought to have been attested by the results of much clinical experience. The statements, therefore, made recently by Whipple and Robscheit as the result of careful research carried on in the George Williams Hooper Foundation for Medical Research connected with the University of California Medical School will come as a surprise to both physicians and pharmacologists. (Arch. Int. Med., May, 1921, pp. 591).

These investigators state that the administration of iron in the form of Blaud's pills, citrate of iron, or of ovoferrin in cases of simple anaemia under carefully controlled conditions is almost inert or at least much less potent than simple diet factors. Their careful experiments give little support to the time honoured custom of administering iron and arsenic to supplement a deficiency of haemoglobin in the system. No special drug tested by them could compare with a carefully selected diet in stimulating the rapid regeneration of the haemoglobin content, especially in the anaemic conditions induced by simple haemorrhage.

These results although to some extent destructive of long-held views, have the

definite constructive value of teaching a wholesome respect for the value of a correct dietary in replacing wastages that may take place in the blood. While we believe that the employment of iron therapy in many forms of anaemia will not be rashly discarded by physicians as *useless*, the great importance of a selected diet and of a healthy digestive tract, in the treatment of anaemias, and other conditions in which some constituents of the blood is assumed to be in deficient amount must not be overlooked.

DIFFERENCE BETWEEN RECTAL AND COLON INJECTIONS

THAT drugs are not absorbed with equal rapidity from the different parts of the alimentary tract has been long recognized; furthermore absorption rate may profoundly influence pharmacological action. Both oral and rectal mucous surfaces often lend themselves to more rapid absorption than the stomach; advantage of this fact is taken in the administration of nitroglycerin under the tongue or of hypnotics, etc., by rectum.

Interesting differences between the effects of rectal and high colonic administration of epinephrin have recently been pointed out by Barbour and Rapoport. Rabbits were found to exhibit the greater blood pressure effect after injections by rectum; on the other hand high colonic administration enhanced the glycosuric and accompanying diuretic effects. (See Barbour, H.G., and Rapoport, F. H., Journ. Amer. Med. Assoc., 1921, 76, 492.)

So far as venous drainage is concerned the differences are readily explained by the anatomical conditions. Rectal venous blood is conveyed directly to the vena cava and the pressor effect of epinephrin is favoured. The portal system, however, drains the colon, thus promoting the mobilization of glycogen from the liver, also delaying the ingress of epinephrin to the circulation ("detoxifying" effect.)

Various clinical possibilities are suggested by the above-mentioned pharmacological investigation. Not only does it call attention to the effectiveness of rectal administration for obtaining a sustained action of epinephrin upon the circulation, but it also indicates that when the lower bowl is chosen as a portal of entry for drugs much may depend upon whether colon or rectum be selected.

THOSE of our readers who attended the annual meeting at Halifax will remember that it was unanimously decided that beginning January 1922 the annual fee for membership in the Association should be increased to $10.00. It has always appeared to the writer that our members have regarded the annual fee to the Association as a subscription to the Journal. The fact is that the present fee of $5.00 hardly pays for the printing of the Journal. We wish it to be understood in future that the increased fee of $10.00, which includes the Journal, is really a fee for membership in the Association, and that our members will receive full value under the new plan of re-organization outlined in the report of the Committee which appeared in our September issue. We hope that our members will respond to our appeal and accept promptly the draft for $10.00 which will be presented to them in January.

J. W. SCANE,
Secretary-Treasurer.

Men and Books

THE CENTENNIAL OF RUDOLF VIRCHOW, 1821-1921

By Horst Oertel, M.D.

Professor of Pathology, McGill University

IT is a curious coincidence that the birth of the founder of modern pathology and of McGill University fall in the same year, and that one of the days of McGill's centennial celebration and the birthday of Virchow are the same (13th October). Thus, McGill University has witnessed the whole rise of scientific medicine of the nineteenth century. When it was founded cellular pathology, bacteriology, the laws of heredity, the graphic methods of physiology, experimental psychology, antisepsis, anaesthesia, to say nothing of the super-structures in practical medicine and surgery, were, in the modern sense, unknown. No other century has ever witnessed such a tremendous development in all fields of science. It was productive not only in great individual discoveries, but in the development of fundamental scientific principles. It is in regard to the latter that Virchow takes the front rank. He accomplished a fundamental change in scientific attitude in medicine and even in biology. His merit does not shine with the isolated brilliancy of particular discoveries, it does not lie in an enrichment of one or another field in science, but it is much greater. It is the creation, by two great steps: first, of the corner stone upon which all present conceptions in medicine and biology rest, and second, of a method of objective investigation and reasoning which brought forth the whole structure of modern medicine in all its fields. For whether an investigator deals to-day with chemical, physical, or morphological problems of life, he follows in Virchow's footsteps.

In order to appreciate the greatness of these two accomplishments and to trace their origin, it becomes necessary to sketch briefly the historic and contemporary background of Virchow's time.

It may seem strange to-day that up to the middle of the last century medicine and biology absolutely lacked a uniform scientific standpoint and method of approach.

A curious phenomenon is here to be observed. While the rise of natural sciences during the seventeenth and especially the eighteenth century had profoundly influenced the spirit of the time and philosophical ideas, and it had, in combination with humanistic influences, broken down the old fossilized scholasticism, the natural sciences themselves still remained strongly bound to old metaphysical ideas and scholastic methods. Thus, although individual efforts bore fruit here and there and augmented knowledge, these efforts remained as ununited links of a chain and lacked fundament. Nowhere was this lack of scientific basis and cohesion more noticeable and disastrous than in biology and medicine. For, although a great philosopher, Kant, had already laid down the principles of scientific judgment and critique, the workers in the sciences themselves remained strangely unconcerned. Thus it happened that when in the year 1839 (the year in which Virchow matriculated as a medical student in Berlin) Schwann published his great work on the cell structure of animals and showed that the ovum was a cell, the significance and meaning of these observations remained hidden, even to him. And Remak, who in 1852, had reached the threshold of the importance of cell structure and life in the conclusion that all embryonic cells originated from other cells, did not cross this threshold.

Cells were recognized, but only as building material.

Virchow's scientific career had at that time already made itself felt, for he had clearly laid down his program and method of research. This is to be noted in his first investigation on "Phlebitis," which he, at Froriep's instigation, had begun in 1844.

Two great principles guided him:

First, knowledge of processes of disease must have an objective, anatomical basis.

Second, conclusions of the nature of diseases must be based on objective experience and strictly according to the laws of cause and sequence.

Although he did not actually formulate these principles in these words, they permeate all his works from beginning to end. When he read his paper on "Inflammation of the Veins" on the second of August, 1845, the occasion of the fiftieth anniversary of the foundation of the Academy of Military Surgeons in Berlin, he precipitated general indignation and resentment. Any such mechanistic conception of disease and life as Virchow advanced seemed to almost everyone heresy and impossible. Busch, the director of the Obstretical Clinic exclaimed, "Well, well, did you hear that? He tells us that we know nothing at all." Few only saw its importance and the dawn of greater things.

Thus also, Rokitansky's great work on Pathological Anatomy (1841-1846) as excellent and accurate as it was in the details of histological changes, still clung tenaciously to the old metaphysical views of the humoral nature of disease. He still traced diseases to faulty mixtures of the blood. "Dyscrases" produced, in turn, diseases of which the histological changes were only local expressions.

Gradually Virchow's own views had matured. Not only had his histological examination of normal and diseased tissues convinced him of the functional importance of cells as regards life, but his studies of the connective tissues led him to the most important conclusion that all cells come from pre-existing cells. The latter point had remained obscure even to Schwann. It was then generally held that cells originated from an unorganized germinal substance, the blastema, and that out of this was differentiated first a nucleus and later, by diffusion through the nuclear membrane, the cell protoplasm. Thus, the intercellular substance and exuded fibrin were regarded as mother substances of cells and all inflammatory and even tumor cells were traced to vital differentiation of such, at first unorganized, blastemas.

In 1858 Virchow's ideas had sufficiently matured in him to present them in co-ordinated, connected form in a series of twenty, now justly famous, lectures to an audience of physicians under the title "Cellular Pathology, as based upon physiological and pathological histology."

Four great principles were here advanced by him of which he formulated concisely the first two, while the other two follow of course.

First, the cell is the unit of life, that is, "Every animal presents itself as a sum of vital unities, every one of which manifests all characteristics of life. These are arranged in cell territories and united by an intercellular substance. But the latter is not destined to form new cells, as Schwann and others would have it, but dependent in a certain definite manner upon the cell."

Second, all cells develop from pre-existing cells. (Omnis cellula e cellula).

Third, diseases are pathological cell changes and disturbed cell relations.

Fourth, the anatomical changes thus produced constitute the disease.

Herewith Virchow discarded all speculative fantastic systems in medicine, and incidentally in biology, and created the modern objective study of disease and the anatomical (visual) conception of diseased processes as cell changes.

Whatever scientific thought has been produced since Virchow has only enlarged, never contradicted these principles. Their establishment remains Virchow's greatest and lasting contribution to science, but not the only one. There is in the whole domain of pathology no field which he has not enriched by his own work and especially by stimulating ideas, and it is interesting to note that some of his views which were discarded at one time are revived to-day, to shine with brighter light. Thus, his ideas on increased functional activity under inflammatory irritants and the existence of formative stimuli have received confirmation by modern experimental methods.

It need not be concealed that he fell into errors which later research corrected, his greatest being perhaps his idea on cancer which he traced to the connective tissues, an idea which, under his authority, continued until Waldeyer and Thiersch properly established cancer as an epithelial growth, in the early eighties of the last century. His reluctance in recognizing bacteriology as a part of pathology continued to his end and is responsible for the strict separation of pathology and bacteriology in Germany to the present day. Thus, also, he had little use for advances in histological technique and in the new staining methods, in fact for everything that made investigation easy and was a short

circuit to knowledge. And he undoubtedly went too far in his objections to them.

It would be an error to refer to Virchow as a morphologist. It is quite true that sound objective anatomical evidence remained for him the foundation of all biological knowledge, but his understanding and interpretations were always made in the functional, dynamic sense. The establishment of a pathological physiology, based of course on and in conformity with the facts of anatomical experience, was foremost on his mind and he was anxious to obtain experimental evidence for the elucidation of individual problems. But he knew, as well as we know it to-day, the limitations of the experimental method, knew that we never can bring about experimentally all phases and circumstances of a disease, and that the "natural experiment," that is the diseased body, remains after all the main and most reliable source of information.

Moreover, he had the sound judgment that nothing is worse for a scientist than to split and dissipate his energies amongst many things, but that he must preserve his resources for those partitions of science which need them most and through which he can most accomplish.

Here Virchow stands out as a great teacher and leader of human thought. No other scientist has ever brought about greater, more general, far-reaching, academic reforms. He organized, one might say unconsciously, pathological and medical teaching of the whole world. He built the first pathological institute in which all departments of pathological research were properly housed, united and co-ordinated. He insisted upon it as an academic university institute, on hospital grounds; and he had the satisfaction to see that every university of note in the world followed. His courses were duplicated everywhere. One of the first things Osler did when he returned from Berlin to Montreal was to adopt Virchow's teaching methods and Osler never grew tired of emphasizing their importance.

Virchow lifted the department of pathology which until his time had simply been the appendix and handmaiden of the wards to the centre of hospital activity and university life, around which the various departments of the medical faculty are grouped and from which they radiate. He thus made possible the development of modern scientific medicine. The value of a pathological institute to him lay not in the work which it did for the hospital wards, but in the training and scientific attitude which it developed in hospital and medical faculty, and in forming the essential bridge between anatomy and physiology on one side, and the clinical branches on the other.

Virchow was an interesting personality, but to many not attractive. Coming from an old Pommeranian family, the father a hard-headed, conservative, old-fashioned, small farmer and city chamberlain in Schivelbein, the more elastic broader mind of the son came into early and frequent conflicts with him, chiefly on account of his freer ideas, political views and opposition to constituted authority. These also brought him into greater trouble in the revolutionary Berlin elections of 1849. Virchow at that time was already prosector in the "Charité" Hospital and also had the privilege of board and lodging. He had carried on an active campaign and election propaganda in the Charité Hospital, a government institution, against the Government. Thereupon, the Minister of Public Education, under a very natural pressure by Government and certain political factions relieved Virchow of his government position in the Charité. This, however, precipitated such a protest from students, physicians and others who had academic freedom at heart, that the Minister of Education rescinded the order of dismissal and only requested Virchow to move into different quarters where his political influence on officials and employees of the Charité need not give rise to apprehension. The Ministry also, apparently as a sort of compensation, granted him one hundred and fifty dollars for scientific research. But in the meantime Virchow received a call to Würzburg. Even before Virchow's open political difficulties in Berlin, negotiations had been in progress between the medical faculty of Würzburg and the Bavarian Government to extend a call to Virchow. The chief promoter of this scheme was Rinecker, to whose wise judgment the medical faculty in that university already owed the selection of Kiwisch, in gynaecology, and Kölliker, in anatomy. But the Bavarian Government at first hesitated on account of strong clerical and political opposition to Virchow, but finally consented and Virchow was officially called. Thereupon he made certain demands in Berlin which, as the Minister of Education stated at that time, could not be met for financial and other reasons and Virchow accepted Würzburg. I have related this story in some detail, because

it is often inaccurately quoted. This happened in 1849. In 1856 the University of Berlin recalled him on his own terms. It is only fair to acknowledge that no other Government ever subordinated its own feelings and wishes in greater measure to academic autonomy and demands than the Prussian Government did in recalling Virchow to the University of Berlin. Here he remained to his death in 1902.

Like all great men Virchow was a curious psychic mixture, in some points paradox. He lacked the "milk of human kindness" and that encouragement and kind manner towards others which we like to see in our own great men, so beautifully examplified by Osler. He was a hard task-master, often, so many thought, too brusque and provocative. As he set the highest standard for himself, so he expected it in others. He despised amateurish meddling and dilettantic display and condemned them with strong words. The scientific "climber" found no friend in him. He was at times perhaps unnecessarily severe and direct in criticism and students have told me that in examinations he treated them brutally. He had, at any rate, the reputation of being the hardest examiner "to get by." Even in lectures and demonstrations his sarcasm was often cutting. He showed at times an almost insulting attitude to others in regard to his own importance and that of his subject. He would come and go when he pleased, commence and finish lectures when he pleased, and was passionately annoyed if any one took exception to his arbitrary ways. The story is told that there were so many complaints about Virchow to the Minister of Education that that official had a special cabinet built for them in the Ministry. This is an apparent exaggeration, but nevertheless reflects the general feeling regarding Virchow. Even his assistants had no easy time with him and he was slow in promoting them. Having once made up his mind to something he remained obstinate. He was not at all pleased with the development of modern bacteriology and especially immunology. The chemical explanation of vital processes smacked to him too much of the old humoral pathology. Strange enough some of his objections are supported to-day by recent physical and colloidal knowledge of cell activities. Moreover, the fantastic imagination of some of the experimentalists aroused his wrath. It seemed to him a return to what he had so successfully fought against in the establishment of cellular pathology and objective observation.

But all of Virchow's faults were really parts of his virtues. He identified himself with his subject, and virtues and faults both sprang out of this identification. He had, like all prophets, supreme confidence in himself and his mission and the objectionable exaggerations of his personal character were due to it. It is doubtful whether he ever could have accomplished what he did had be been softer, more easily adaptable, malleable and compromising. He saw a tremendous as yet unshaped task before him, and like the sculptor, he wielded mallet and chisel with strong hands to give it serviceable form.

With it all he was just and fair and no one has ever had greater regard for duty and responsibility. At the heated discussion on the value of diphtheria antitoxine in the Berlin Medical Society, shortly after it was introduced in 1894, I heard him discuss the question with eminent fairness and impartiality.

In stature Virchow was small and appeared, at least in older age, as I remember him, rather delicate. But his constitution was rugged. His face was typical of the scholar, his eyes penetrating and active, his speech direct, sometimes hesitating, but always sincere without any effort to conceal his ideas. He loathed hypocrisy and speech was not given him to conceal his thoughts.

Like most intellectual men he lived well. He himself tells us that in his early days in the Charité he commenced the day at 8 o'clock in the morning with meat and beer, followed by an equally abundant lunch, "without these sustaining matters the work of the day would have been too exacting." At the dinner he gave in honor of receiving his doctor's degree he and his guests finished a case of wine, sent by his father, followed it by champagne and punch and reached home at 3 o'clock. Next morning he was the guest of his colleagues in the Charité at an equally good "breakfast." At one time he remarked "I have learned more in conversation over beer and wine than sitting at my desk."

He was capable of fine emotions. For Pasteur he maintained throughout a high regard and he loved England, the English and the Scotch and much enjoyed his English visits. The same, sober, objective mind of the British scientists appealed to him tremendously and was kin to his own mind and reason. For Lister he had developed during a long friendship not only high admiration, but a genuine affection and at a

small private dinner given by Virchow he paid such a tribute to Lister and in such an affecting way that the latter could with difficulty only restrain his emotion.

Virchow's name and work are imperishable. The tribute which Welch paid to him at his death may well be repeated here:

> "Important as was the reformatory influence upon medicine of the discoveries and work of the few leaders whose names are worthy to be placed beside his, such as Galen, Vesalius, Harvey, Hunter, and Pasteur, it may be safely said that the establishment by Virchow of the principles of cellular pathology marked the greatest advance which scientific medicine had made since its beginning."

Virchow's grand impressive public funeral, unique in pomp and splendour in academic annals, in which his Emperor, the State, the City and the World paid him homage, was that of a valiant hero, who had died fatigued by victories, unconquered!

The Association

REPORT OF THE COMMITTEE ON PUBLIC HEALTH AND HYGIENE

The undersigned, your Committee on Public Health, respectfully submit the following proposed resolutions for your consideration:—

1. That the Association would, again, draw the attention of the profession throughout Canada, to the very great necessity of reporting all cases of Venereal Diseases of which its various members become cognizant, to the Provincial Health Authorities concerned, in accordance with the several laws and regulations laid down for that purpose by the said Health Authorities.

2. That this Association would respectfully point out to the Federal Department of Health the unwarranted delay and the unnecessary expense entailed in the quarantine of passengers and other occupants of vessels, arriving at Canadian Quarantine Stations, who have been in contact with Small-pox, beyond the time necessary to prove beyond reasonable doubt the immunity to Small-pox of said passengers and other said occupants, as ascertained by (1) a prior attack of the disease, (2) by recent and successful vaccination, or (3) by successful vaccination performed at or about the time of the occurrence of contact.

This Association would respectfully submit that said passengers and others upon said proof of such immunity being had, be forthwith released from quarantine after a thorough disinfection of their persons and personal belongings.

3. That this Association desires to place on record its disapprobation of the employment by either public school, or health authorities of persons other than regularly qualified medical practitioners as Medical Inspectors of Schools. This Association believes that such practice is defeating its object and affords a false security by introducing an element of incompetency, likely to bring Medical School Inspection into disrepute and entail, at times, serious consequences.

(Sgd.) Geo. Melvin, *Chairman.*
C. J. Hastings.
A. J. Douglas.
Committee on Public Health.

Fredericton, N.B.,
May 6th, 1921.

Resolutions Adopted at General Sessions, Halifax, July, 1921.

On Insurance Fees.

Resolved. "That whereas the fees for medical insurance examinations vary from one province to another, and are recognized as too low in some provinces ($4.00 and $3.00 paid by some Insurance Companies), *Whereas:* The New Brunswick Medical Society at its last annual meeting studied the question of insurance fees and expressed the opinion that the establishing of uniform fees for insurance examinations throughout the Dominion should be referred to the Canadian Medical Association for immediate action.

Be it resolved that: This Association considers it desirable that uniform and adequate fees be paid by the Insurance Companies to their medical examiners throughout the Dominion and that the General Secretary be instructed to take the matter up immediately with the Association of Life Insurance Underwriters."

On the Standardization of Hospitals.

Resolved. "That the Canadian Medical Association, at its Annual Meeting at Halifax desires to express its unqualified approval of the plan of Standardization of the Hospitals of the Dominion as being now undertaken under the supervision of Dr. M. T. MacEachern of Vancouver."

The Association also approves of the appointment by Dr. MacEachern of a special agent for this purpose.

On the Formation of a Canadian College of Physicians and Surgeons.

Resolved. "That whereas, owing to the lamented death of the late Dr. McCallum of London, Ontario, Chairman of the Committee on the formation of a Canadian College of Physicians and Surgeons, the work of the Committee has not progressed sufficiently to make a comprehensive report at this meeting of the Canadian Medical Association at Halifax:—be it resolved that the Committee be continued and requested to make a report at the next general meeting of the Association; and that the Committee be enlarged to include a representative from each Province of the Dominion."

On Patent and Proprietary Medicines.

Resolved. "That in the opinion of this Association the claims in regard to many of the Patent and Proprietary Medicines on the market are unjustifiable, and that they constitute a danger to the public. It would therefore urge upon the Dominion Government that it make use of the Proprietary or Patent Medicine Act as it at present stands, and under Section 7 (1), (e) and (f), proceed against those manufacturers or dealers, who represent a remedy as a cure for any disease, or who place on the wrapper or label, or in any advertisement of the article, any false, misleading or exaggerated claims in regard to the article."

On the Re-Organization of the Canadian Army Medical Corps.

Resolved. "That whereas as the Association does not approve of the findings of the Committee on the Re-Organization of the Canadian Army Medical Corps, it is moved that the said Committee be disbanded and the matter closed."

On the Museum Exhibit.

Resolved. "That the warm appreciation and sincere thanks of the Canadian Medical Association be conveyed to the Canadian Government and to the Universities of Toronto, Queen's, McGill, and Dalhousie, for the splendid and representative exhibits from the Canadian Army Medical Museum, and the Pathological Departments of the said Universities, which have contributed so greatly to the interest and enjoyment of this meeting, and have served to enhance its scientific status."

Resolved also. "That in view of the educational value of the material from the Canadian Army Medical Museum, and of the fact that these meetings are the only means by which it can be brought to the attention of the medical profession of Canada at the present time, it be respectfully suggested to the Canadian Government that similar exhibits be presented at future meetings of this Association."

Resolved further. "That a copy of this resolution be sent to the Director General of Medical Services."

Notices of Motion.

Dr. Argue gave notice that at the next Annual Meeting he would move that the By-Laws of the Association be amended as follows:—

Chapter VII., Section 6 (The Council):—

After the word "Committee" Line 3, to insert the words:—"To be known as the Executive Committee and which shall consist of (a) Seven members appointed by the Council from amongst its members and (b) Two representatives from each province to be appointed by the Provincial Association.

Also Chapter VIII., Section 1 (The Exe cutive Committee), the word "THREE" at the beginning of the last sentence of the section to be altered to read "FOUR."

Dr. George Bingham gave notice that at the next Annual Meeting he would move:—

"That when, and wherever the Canadian Medical Association meets in each of the Provinces, the Meeting shall be held in conjunction with the Provincial organization, and that the local organization shall have control of the arrangements and as far as possible, the preparation of the Scientific Programme."

News Items

THE ONTARIO MEDICAL ASSOCIATION.

(Continued from last issue)

The Business Programme of the O.M.A. meeting at Niagara was scheduled as follows:

The important details of this programme will be reported in full, as the Editorial Board feel that it is to the interest of every practitioner to have all the procedures of these active committees put clearly before them; it is most apparent that these various committees are rapidly getting in touch with matters which vitally concern the profession in Ontario.

Tuesday, May 31, 1921.

11.00 a.m. Meeting of the Executive Committee.
11.30 a.m. Meeting of the Committee on General Purposes.
2.00 p.m. Meeting of Committee on General Purposes.
6.30 p.m. Round Table Dinner and Discussion.

Wednesday, June 1, 1921.

9.00 a.m. General Business Session of the Association.

Thursday, June 2, 1921.

11.30 a.m. General Business Session of the Association.
11.45 a.m. Meeting of Committee on General Purposes.

Friday, June 3, 1921.

11.30 a.m. General Business Session of the Association.

Meeting of the Committee on General Purposes held at the Clifton House, Niagara Falls, on Tuesday, May 31st, 1921, at 11.30 a.m.

Upon calling the meeting to order, the President, Dr. Mullin, announced to the Committee the acceptance by the Directors of the Articles of Incorporation, and then turned the meeting over to the Vice-President, Dr. Farley, as Chairman of the Committee on General Purposes.

Dr. Farley, in assuming the chair, in a few chosen words, welcomed the members of the Committee to the meeting. Twenty-seven members responded to the roll-call. Several communications were then received, and by resolution moved by Dr. Elliott, seconded by Dr. Boyce, were referred to the respective Committees.

Moved by Dr. Elliott and seconded by Dr. Cameron:

That the income tax matter be referred to a special sub-committee (Drs. Henderson, Young and Cruickshank), and that this Committee be asked to report through the Committee on General Purposes to the general meeting of the Association. Carried.

The sub-committee on Dominion Taxation begs leave to report and recommend as follows:

Whereas the sub-committee has ascertained that in various places and in various cases in this Province exemption from taxation has been refused for the following items of necessary business expense, namely:

(1) Membership dues in scientific and medical societies and the expenses incurred in attending the annual meetings of the same.

(2) Subscription to scientific and medical periodicals;

(3) Expense of attendance on post graduate courses of University instruction;

Therefore the Ontario Medical Association resolves to instruct the incoming Executive to make representations to the Minister of Finance that these are genuine items of business expense, and should be exempt from taxation.

Moved by Dr. Henderson and seconded by Dr. Farley:

That this report be accepted, and that a copy be forwarded to the Canadian Medical Association. Carried.

Moved by Dr. Mullin and seconded by Dr. Cameron:

That the telegram of greetings from the Ontario Dental Association be received and passed on to the general meeting for the necessary action. Carried.

The meeting adjourned at 12.45 p.m. for luncheon.

Reconvened meeting of the Committee on General Purposes on Tuesday, May 31st, 1921, in the Clifton Hotel at 2.00 p.m., with the

Chairman, Dr. Farley, in the chair, and with forty-two members of the Committee present.

Dr. Mullin introduced Dr. MacEachern of Vancouver to the meeting, and by unanimous consent of all present, Dr. McEachern was extended all the courtesies of the Committee.

Moved by Dr. Secord and seconded by Dr. Sinclair:

That the minutes of the previous meetings of the Committee on General Purposes for the past year, be taken as read. Carried.

Moved by Dr. Mullin and seconded by Dr. Morgan:

That the following applications for affiliations with the Ontario Medical Association be received and temporarily accepted pending the report back to the Committee on General Purposes of the following Sub-committee of this Committee on General Purposes. Carried.

Bruce County Medical Society.
Haliburton County Medical Association.
Lanark County Medical Society.
Ontario County Medical Association.
Norfolk County Medical Society.
North Bay Medical Society.
Parry Sound Medical Association.
Toronto East Medical Association.

The Chair then named the following sub-committee: Drs. Argue, Cameron, Longmore, Secord and Cruickshank.

Moved by Dr. Mullin and seconded by Dr. Henderson:

That the Nominating Committee be as provided for in the by-laws, and that each County Society represented at this meeting, appoint its respective delegates to the nominating Committee. Carried.

Moved by Dr. Bruce and seconded by Dr. Noble:

That the Nominating Committee be convened at six p.m. on this date. Carried.

Moved by Dr. Henderson and seconded by Dr. McQuade:

That the Committee receive the Executive report as printed, and go into a Committee of the Whole to discuss same, with Dr. Bruce being elected Chairman of the Committee of the Whole. Carried.

Dr. Bruce then took the chair. The Executive report was read clause by clause by Dr. Secord, the following action being taken on certain of the clauses.

Moved by Dr. Mullin and seconded by Dr. Noble:

That the Committee on General Purposes recommend to the Association the advisability of Counsellor District meetings being held as regular fixtures of our Association. Carried.

Moved by Dr. Mullin and seconded by Dr. Oliver:

That the tabulated tariff as printed, be referred to each County Society for report, and that, in case the Secretary does not hear from the County Societies with further reference to the matter, the respective Counsellors be so advised. Carried.

Moved by Dr. MacDonald and seconded by Dr. Argue:

That the incoming Board of Directors be advised to continue negotiations with the Workmen's Compensation Board, and further that the Directors be instructed to request the Cabinet to appoint a representative of the Ontario Medical Association as a member of the Workmen's Compensation Board. Carried.

Moved by Dr. Mullin and seconded by Dr. Anderson:

That the report of the Joint Advisory Committee be received and approved. Carried.

Report of Joint Advisory Committee

Toronto, May 26th, 1921.

Mr. President and Gentlemen:

After the first meeting of the Advisory Committee, the Chairman was instructed to prepare a statement for the Press, which statement was forwarded to each Member of the Committee.

An endeavour was made by letter to the Premier, to get an appointment with the Premier and the Minister of Education for the purpose of ascertaining whether or not medical legislation would be introduced at the next session. This letter was written on April 15th. No reply was received for two weeks, a telephone communication at this time revealing the fact that the Session was taking up so much time that it would be impossible to grant an appointment until the House closed. The Session finished, the Minister of Education was unable to grant an appointment for over two weeks. He notified the Committee, however, that he and the Premier would receive the Committee on Friday, the 20th, at 2 o'clock in the afternoon.

It being impossible to call the Committee together by mail notice each of the members was communicated with by telephone. All approved of the meeting and the object. Dr. Cameron, Dr. Burt and Dr. Argue were not able to be present. The President of the Ontario Medical Association was communicated with and he approved of the meeting and hoped that something would be accomplished thereby. Several names were suggested as substitutes by the members of the Committee, some of whom did not see their way clear to act. However, on Friday the Committee met the Premier and the Minister of Education in the Parliament Buildings. There were present Dr. E. E. King, Chairman, Drs. F. A. Clarkson, G. M. Brodie, and T. C. Routley, Secretary.

The Chairman in presenting the matter to the Premier said that "We are the Advisory Committee appointed by the Executive Committee of the College of Physicians and Surgeons of Ontario, and the Ontario Medical Association. We are desirous of ascertaining the possibility or probability of the Government introducing medical legislation at the next Session of the House.

"This Committee has to report to the Ontario Medical Association which meets at Niagara on the 31st inst. and 1st, 2nd and 3rd of June, and to the Medical Council which meets in the latter part of June. Neither body meets again for a year."

He drew the attention of the Premier to the decision of the Court of Appeal in 1906 in which the definition of the practice of medicine as defined in Medical Act of 1879 was interpreted to mean the administration of drugs; that since that time the bars had practically been down and Ontario had been overrun by irregular practitioners; that the public had suffered therefrom, and that the Medical Act, through its administrators, the College of Physicians and Surgeons, did not have the power to stop them; also that the Medical Council for many years had endeavored to have this matter corrected and the Medical Act amended with the definition of the practice of Medicine brought up to date to cover the situation; he pointed out that the Council had been refused permission to prosecute irregulars under the Act, and the definite promise made by the late Sir James Whitney that the Medical Act would be amended, and that he would appoint a Commission and investigate the whole matter. The Chairman also pointed out that such Commission had been appointed and had presented its report; that the Commissioners' report had been approved by both the College of Physicians and Surgeons and the Ontario Medical Association, and also that neither the Whitney Government, the Hearst Government nor the present Government had ever sustained the Hodgin's Report nor accepted its findings.

The Chairman drew the attention of the Premier to the fact that, if a definition of the practice of medicine could be now established, it would be possible to protect the public from the irregulars, and that the definition as given in the Commissioner's report (page 66 Statutory Changes) was agreeable to the College of Physicians and Surgeons and the Ontario Medical Association.

The Chairman further drew the attention of the Premier to a letter published by the Advisory Committee (Globe, May 3), in which the stand taken by the Profession in regard to the practice of medicine was clearly put forward. He also said that the profession insisted upon standing by preliminary education and professional education, and the necessity of passing an examination. A license should then be granted, but that no one should be allowed to practice on the public who did not receive a license to do so; also that there was no objection to any cult providing that those practicing had proper educational ground work on which to base their diagnostic ability.

He further asked the Premier if this Committee could assure their bodies that legislation would be introduced next year to cover these facts.

Matters referring to the above were discussed informally by all the members of the Committee with the Premier. The Premier and Minister of Education were exceedingly agreeable, received the Committee in a gracious manner and assured the Committee that they recognized the very unsatisfactory condition of affairs, that they desired to clarify the atmosphere and hoped that something would be done at the next Session. There could be no definite promise, but they would look favorably upon any suggestion dealing with the question that could be made through the Ontario Medical Association or the College of Physicians and Surgeons; that they would take the matter up at once with the Cabinet and see how the matter could be introduced and carried through the House.

The Premier drew the Committee's attention to the fact that in public matters of this kind the opinions of the members of the House varied considerably, and that in none of the several groups of the House was there an unanimity of opinion. He felt, however, that the situation as it exists was unsatisfactory, and that he would do anything in his power to clear that situation. He drew the attention of the Committee to the large volume of correspondence that had reached him on this matter, and that some of it was from very prominent people.

The Committee was exceedingly well pleased with the reception given, and felt that a considerable advance had been made toward getting medical legislation at the next Session.

(Sgd.) EDMUND E. KING,
Chairman.

Moved by Dr. Anderson and seconded by Dr. Cruickshank:

That this Committee on General Purposes approve of the appointment of the Joint Advisory Committee members as follows: one member from each of the Medical Faculties actively engaged in teaching in this Province; three members from the Council of the College of Physicians and Surgeons, and three members from the Ontario Medical Association, the duties of this Committee being to co-ordinate the efforts of the bodies they represent with reference to medical legislation, and to carry on such propaganda and publications in keeping with the advancement of proper medical legislation in this Province. Carried.

Moved by Dr. Elliott and seconded by Dr. Argue:

That the incoming Board of Directors be instructed to prepare a resolution to be sent to the Canadian Life Officers' Association, requesting a fee of $5.00 for medical examinations, and further that all American Companies doing business in Ontario be forwarded a copy of this resolution. Carried.

Moved by Dr. Anderson and seconded by Dr. Argue:

That, in future, communications or representations made to, or before, the Provincial Government, having any specific reference to the Hodgins' report be deleted. Carried.

Moved by Dr. Oliver and seconded by Dr. Henderson:

That an honorarium of fifty dollars ($50.00) be paid to our solicitor, Lt.-Col. N. M. Young, as a slight token of our appreciation of the excellent services which he has rendered during the past year. Carried.

Moved by Dr. Mullin and seconded by Dr. Argue:

That the report of this Committee as a Whole, as amending the complete report of the Executive Committee, be received and approved, and accordingly reported back to the Chairman of the Committee on General Purposes. Carried.

Dr. Bruce, Chairman of the Committee of the Whole, in quitting the chair, reported back to the Chairman of the Committee on General Purposes the action which had been taken by the Committee as set forth in the preceding resolution. Dr. Farley resumed the chair, the Committee as a Whole adjourning, and the Committee on General Purposes again coming into session.

Moved by Dr. Anderson and seconded by Dr. Oliver:

That the report of the Committee as a Whole be adopted. Carried.

The Consideration of the Treasurer's Report.

The Honorary Treasurer, Dr. Cameron, in reviewing the printed report, outlined a budget for the ensuing year showing the necessity of again collecting the Guarantee Subscriptions.

Moved by Dr. Cameron and seconded by Dr. Bingham:

That the Treasurer's report be received and approved. Carried.

Moved by Dr. Henderson and seconded by Dr. Cameron:

That in future the Treasurer's report be for the calendar year rather than for the Association year. Carried.

Report of the Committee on Credentials and Medical Ethics.

Moved by Dr. Elliott and seconded by Dr. Argue:

That the report be received. Carried.

Report of the Committee on Legislation and By-laws.

Moved by Dr. Young and seconded by Dr. Elliott:

That the sentence in the report referring to eight ounces, be not adopted, but that the balance of the report be approved. Carried.

Report of the Committee on Education.

Moved by Dr. Elliott and seconded by Dr. Mullin:

That the report be received. Carried.

Moved by Dr. Anderson and seconded by Dr. Bruce:

That that section of the report down to the bottom of page twenty-six excepting the last five lines, be approved. Carried.

Moved by Dr. Bruce and seconded by Dr. Anderson:

That the balance of the report be approved. Carried.

Report of the Programme Committee.

Moved by Dr. Mullin and seconded by Dr. Secord:

That the report be received and adopted. Carried.

Report of the Delegates to the Canadian Medical Association.

Moved by Dr. Bruce and seconded by Dr. Anderson:

That the report be received and approved. Carried.

Dr. Geo. A. Bingham in speaking to this report, outlined the activities of the Re-organization Committee of the Canadian Medical Association which strongly advocates complete reorganization of the Canadian Medical Association with definite provincial participation, and the advisability of a composite fee.

Report of the Committee on Hospital Standardization.

Moved by Dr. Bruce and seconded by Dr. Cameron:

That the report be received and approved. Carried.

Dr. MacEachern of Vancouver was invited to speak to this report, and in a few pointed remarks stated that he hoped that the Province of Ontario would measure up to the requirements as set forth in the report.

Report of the Committee on Venereal Diseases.

Moved by Dr. Bruce and seconded by Dr. Anderson:

That the report be received and approved. Carried.

Report of the Committee on Necrology.

Following is the report of the Committee on Necrology, which report was not in print in our business programme:

May 31st, 1921.

Mr. President and Gentlemen:

Your Committee regrets to report the loss by death of a large number of the profession in Ontario, in all 42, many of whom had been active and energetic members of the Ontario Medical Association.

The death of Dr. W. J. Gibson, Belleville, who was president of the Association in 1898-1899, removed one who was recognized as an outstanding practitioner in the Province.

Dr. Hugh MacCallum of London, widely known both as Consultant and Educationalist, died of pneumonia, Jan. 25th, 1921.

Professor W. H. Ellis, Professor of Toxicology at the University of Toronto, was always a warm friend to the profession, although he devoted himself to academic work.

Others whose loss must be recorded are:

Dr. Thos. Beeman, Perth.
" Hugh S. Bingham, Toronto.
" Robt. A. Bowie, Brockville.
" C. Day Clark, Toronto.
" C. H. R. Clarke, Newmarket.
" John H. Comfort, St. Catharines.
" Jos. W. Cull, Mitchell.
" Walter S. Ferguson, Toronto.
" Wm. J. Fischer, Waterloo.
" David Gibb Fleming, Toronto.
" C. E. Graham, Hull.
" John Grant, Woodville.
" T. Gray, Acton.
" W. J. Greig, Toronto.
" J. T. I. Halliday, Peterboro.
" Archibald Henderson, Hamilton.
" Thos. Hossack, Lucan.
" S. T. Hudson, Roslin.
" J. Hulton, Forest.
" C. A. Jones, Mt. Forest.
" John S. King, Toronto.
" Max Otto Klotz, Ottawa.
" C. H. Lusk, Oakville.
" R. M. Mason, Fenelon Falls.
" James C. McAllister, Hamilton.
" John McCrimmon, Kincardine.
" James McDermott, Sunderland.
" Thos. McKenzie, Toronto.
" E. C. McNichol, Cobourg.

Dr. John A. Merrick, Merricksville.
" John Moore, Shannonville.
" John Mundell, Toronto.
" Edmund Oldham, Chatsworth.
" Robert Shearer, Simcoe.
" S. G. Thompson, Toronto.
" Frank Warren, Whitby.
" Nelson Washington, Toronto.
" Joseph Webb, Waterloo.
" Robert Jas. Wilson, Toronto.

All of which is respectfully submitted.

(Sgd.) FREDERICK C. HARRISON,
Chairman,
Committee on Necrology.

Moved by Dr. Elliott and seconded by Dr. Oliver:

That the report be received and approved. Carried.

The Report of the Committee on Library Matters.

Moved by Dr. Mullin and seconded by Dr. Bruce:

That the report be received and approved. Carried.

The Report of the Committee on Standardization of Drugs.

Moved by Dr. Henderson and seconded by Dr. Cameron:

That the report be received and approved. Carried.

The Report of the Committee on Inter-Relations of Medical Profession and the Public.

Moved by Dr. Mullin and seconded by Dr. Secord:

That the report be received and discussion delayed until after the Round Table dinner. Carried.

Report of the Committee on the Liquor Problem.

Moved by Dr. Elliott and seconded by Dr. Secord:

That the report be received and approved.

Herewith is appended the supplementary report of this Committee, which did not appear in our printed programme:

Your Committee also desire to present the following supplementary report dealing particularly with the questionnaire recently sent out. It has been impossible to finish the analysis of the answers given, and the committee, therefore, present this merely as an interim report. It will be noticed, however, that the results so far fully justify the recommendation already made, that the Ontario Medical Association should make a strong appeal to the profession to exercise great care in the issuing of prescriptions.

Composite Report of 510 papers read.

ONTARIO MEDICAL ASSOCIATION.

The Relation of the Physician to the Ontario Temperance Act.

1. Any legislation which is intended to stop the use of liquor as a beverage, must at the same time provide some *method* by which it may be obtained for medicinal purposes. Is your this opinion? Yes, 474-31.

2. Do you consider the *method* provided in the Ontario Temperance Act satisfactory? No, 318-176.

3. Have you any criticism to offer as to the way the clauses in the Ontario Temperance Act relating to the physician are enforced? No, 252-165.

4. Are you in favor of limiting all prescriptions (for either druggist or vendor) to a quantity not exceeding six ounces? No, 353-133.

5. Are you in favor of limiting all prescriptions (for either druggist or vendor) to eight ounces? No, 326-127.

6. Would you be in favor of issuing a Special License to physicians for the prescribing of liquor, so that any physician not wishing to prescribe, might be protected from requests by reason of not having such a license? No, 335-153.

7. What do you consider to be the average number of prescriptions per month which you find it necessary to write for internal use? 16.94.

8. Would you favor making it obligatory for all druggists to carry in stock whiskey and brandy in original six ounce packages? Yes (if possible), 306-176.

9. Last year the Special Committee asked for consideration of the following question:

Would it be advisable to strike out the portions of the Act relating to the sale of liquor by vendors on medical prescriptions (Sec. 51, subsections a, b, c.) and to substitute the following:

1. Any adult may obtain a quantity not exceeding one quart from a vendor not oftener than once a year, on making an affidavit that it will be used for medicinal purposes, and that no other member of his or her family residing under the same roof, has procured liquor from a vendor during the preceding year.

2. In order to provide for those cases in which a larger quantity of liquor is required in any one year, the Board of Commissioners shall employ regularly an appointed medical officer to make personal investigation in such cases and issue orders if he sees fit.

Would you favor such an amendment? No, 289-203.

10. The plan suggested in question No. 9 is opposed by the License Commissioners on the ground that it would increase the amount of liquor consumed for beverage purposes and so tend to defeat the purpose of the Ontario Temperance Act. Is this your opinion? No, 244-196.

11. Have you any suggestions to make whereby the working of the Ontario Temperance Act may be improved in relation to the interests of the physician? No, 162. Yes, 199.

12. Have you any suggestions to offer whereby the Ontario Temperance Act may be improved to protect the physician against the importunities of citizens who wish liquor for beverage purposes? Yes, 166. No, 161.

The circular of the License Commissioners sent out during the last few days, and also the questionnaire, in so far as it has been considered, both call attention to the danger of ethyl alcohol prescribed for external use being used for beverage purposes. We would, therefore, suggest that the License Board investigate the question as to whether spirits for external use may be denatured without making it unsuitable or dangerous.

The Commissioners in their circular state that they are considering the advisability of "delivering prescription orders in cities where dispensaries are located, for the purpose of ensuring that the liquor reaches the right place or is returned if address is in part or whole fictitious." We believe that this would eliminate some of the applicants against whom the physician has to contend. It would be necessary, however, to provide for delivery to bearer in case of emergency, the prescription being so endorsed by the physician.

In conclusion your Committee feel that the physician's burden might be lightened if it were made a misdemeanor punishable by law for any person to make application to a physician for liquor for beverage purposes.

(Sgd.) GEO. S. YOUNG, Chairman.

Moved by Dr. Secord and seconded by Dr. Anderson:

That that portion of the report of the Committee on the Liquor Problem dealing with the results of the questionnaire sent throughout the Province, be given to the press after being passed upon by the general Association. Carried.

The meeting adjourned at 6.00 p.m. for the Round Table Dinner.

The Committee on Nominations met at 6.00 p.m. with the following members of the Committee present: Drs. Noble, Young, Bruce, Anderson (Academy of Medicine, Toronto); Drs. Argue and Hutchison (Ottawa); Dr. Longmore (Northumberland and Durham Co.'s); Dr. Boyce (Kingston); Dr. McQuade (Hastings) Co.); Dr. Oliver (Thunder Bay Dist.); Dr. Morgan (Peterborough Dist.); Dr. Niemeier (Hamilton); Dr. Secord (Brant Co.); Dr. Krupp (Woodstock); Dr. Routley (York Co.).

After the roll was called, the Committee adjourned to meet at 10.30 p.m. on this date, following the Round Table Dinner.

The Round Table Dinner which has become a fixture of our annual meetings was very well attended, over one hundred members being present. Excellent addresses were given by Prof. Gilbert Jackson of Toronto University, and Dr. A. T. Lytle of Buffalo. The Round Table conference which followed, was presided over by Dr. J. W. Crane of London, who was acting for Dr. H. W. Hill, Chairman of the Committee on Inter-relations of the Medical Profession and the public, Dr. Hill being unavoidably absent. Over thirty members of the profession participated in the three-minute limit discussion, and it was felt by those present that a very profitable evening had been spent.

Reconvened meeting of the Committee on Nominations at 11.15 p.m., Tuesday, May 31st, 1921. By a unanimous resolution of the Committee, the following Officers and Counsellors were named as the list to be submitted to the Association for election:

Officers:

President: Dr. F. J. Farley, Trenton.
1st Vice-Pres.: Dr. E. R. Secord, Brantford.
2nd Vice-Pres.: Dr. J. A. Macgregor, London.
Treasurer: Dr. G. Stewart Cameron, Peterborough.
Secretary: Dr. T. C. Routley, Toronto.

Counsellors:

District No. 1. Dr. R. J. Macdonald, Sarnia.
" No. 2. Dr. Weston Krupp, Woodstock.
" No. 3. Dr. Geo. S. Burt, Owen Sound
" No. 4. Dr. F. W. E. Wilson, Niagara Falls.
" No. 5. Dr. Geo. S. Young, Toronto.
" No. 6. Dr. E. A. McQuade, Trenton.
" No. 7. Dr. H. A. Boyce, Kingston.
" No. 8. Dr. J. Fenton Argue, Ottawa.
" No. 9. Dr. Edgar Brandon, North Bay.
" No.10. Dr. E. B. Oliver, Fort William

Moved by Dr. Anderson and seconded by Dr. Oliver:

That the President and Secretary interview the nominees relative to their names going on to the general Association. Carried.

Moved by Dr. Oliver and seconded by Dr. McQuade:

That the next annual meeting be held in Toronto, following upon the invitation very kindly extended by the Academy of Medicine, Toronto. Carried.

Moved by Dr. Noble and seconded by Dr. Young:

That the Finance Committee be re-elected. Carried.

The Finance Committee: Dr. G. Stewart Cameron (Peterborough); Dr. Mackay (Collingwood); Drs. John Ferguson and R. T. Noble (Toronto); Dr. Davey (Hamilton).

Moved by Dr. Longmore and seconded by Dr. Noble.

That the complete report of the Nominating Committee be adopted. Carried.

(To be concluded)

BRITISH COLUMBIA.

The second annual course of Clinics and Lectures, under the name of the Summer School of the Vancouver Medical Association was held in Vancouver during the week of August 22nd to 27th. That some such course was both possible and desired was evident by the registration of 180 medical men, who came from as far North as Prince Rupert, and as far East as Calgary, while the State of Washington sent an unexpectedly strong representation.

Dr. Charles Hunter of the Department of Medicine, of the University of Manitoba was the guest of honour, if such a term was applicable to one who worked so hard. His series of four clinical lectures comprised one on Nephritis, one on the nervous element in disease (which was especially popular), one on Blood pressure, both high and low, and one on Gastro-intestinal disorders; they attracted capacity audiences and awakened keen interest.

The surgical part of the programme was in the hands of the British Columbia section of the American College of Surgeons, under the presidency of Dr. I. Glen Campbell. Operation clinics and Demonstrations were given on the mornings of August 22nd and 23rd by local Fellows of the College. On the afternoons and evenings of the same days the time was well filled with scientific papers and public meetings. As visitors, Dr. J. O. Polak of Brooklyn, N.Y., and Dr. Franklin Martin of Chicago took a prominent part in the proceedings.

On August 24th and following days, from 9 in the morning to 5 in the evening, clinics were given by members of the Vancouver Medical Association, which embraced a wide range of subjects. Dr. G. S. Gordon spoke on prostatic obstruction, and Dr. J. Ewart Campbell on syphilis, showing numerous examples; Dr. A. W. Hunter, Pathologist to the General Hospital, gave a lantern demonstration of the morbid anatomy of the Kidney; Dr. Glen Campbell spoke on the more frequent affections of the Eye, and Dr. Carder and Dr. Covernton took up the important question of Infant and Child feeding. Dr. Cunningham with Dr. F. W. Brydon Jack demonstrated the use of the Bronchoscope to many interested spectators. Dr. F. C. McTavish gave an address on the Deformities resulting from infantile paralysis and their treatment. Dr. C. S. McKee, in charge of the laboratory at St. Paul's Hospital, Vancouver, spoke on the subject of Anaemia, especially of its early recognition; while Dr. Mullin, Director

of Laboratories at the General Hospital, dealt with the subject of Glycosuria, following the instructions of the Committee, that the work was to be of an essentially practical nature.

Dr. Cumming with Dr. Coleman explained some of the developments of Bio-chemical methods as applied to medicine, giving a lucid description of the chemical and physiological principles underlying the determination of Basal metabolism. To Dr. T. R. B. Nelles was entrusted the demonstration of certain of the commoner forms of Skin disease and their care. Dr. Vrooman, Chief of the Rotary Clinic for the tuberculous, spoke on the recognition and treatment of that disease.

Dr. Frederic Brodie dealt with the subject of Brain injury, illustrated with examples from the late war.

Dr. Mason took Prolapse of the Uterus as the basis of his remarks and Dr. W. B. Burnett gave an excellent clinic on certain forms of Dystocia.

Dr. B. D. Gillies gave a lantern demonstration on the Electro-cardiograph, and showed numerous slides illustrative of various forms of Arrhythmia.

Dr. H. H. McIntosh and Dr. Prowd, of the X-ray departments of the General Hospital and St. Paul's Hospital respectively, took up the question of the Roentgen ray diagnosis of diseases of the chest. The slides exhibited a wonderful series of aneurisms of the thoracic aorta.

To give an air of completeness to a week which surely taxed the absorptive powers of the most ardent student, the British Columbia Medical Society held meetings on two evenings during the week and gave a Dinner at the University Club on Friday night. At these meetings the re-organisation of the Society was completed, and plans laid for an aggressive campaign in the interests of the Profession, and the Public alike.

The indefatigable superintendent of the General Hospital, in whose hands all the arrangements worked with smoothness and precision, established in the building a miniature hospital ward, and brought together a number of exhibitions of books, instruments, etc., which greatly added to the interest of the meeting.

It is expected that this, the first attempt at Post-graduate instruction in the Far West by Western men, will be repeated next year on a larger scale.

Abstracts from Current Literature

SURGERY

Skin-grafting in the Buccal Cavity. KILNER, T. P., and JACKSON, T.: *Brit. J. Surg.*, July, 1921, p. 148.

THE paper deals with a technique evolved at Queen's Hospital, Sidcup, in the treatment of facial injuries.

Cases in which the method is applicable:

a—Absence or shallowness of external alveolar sulcus.

This condition prevents the proper functioning of an artificial denture as movements of lip or cheek disturb it from its insecure bed. The disability is seen at its worst when the jaws are edentulous, and may be the result of facial injuries with or without fracture of mandible, of burns of mouth from steam or caustics, from abnormally thick lobial fraena, from band of scar tissue subsequent to rupture of alveolar abscess, or from adhesion following operation for hare-lip. Excessive absorption of alveolus following teeth extraction may act similarly and prevent the wearing in comfort of an artificial denture on the lower jaw.

b—Deficiency of the internal alveolar sulcus.

Much more uncommon and subsequent upon injury of lateral aspect of tongue and adjacent floor of mouth.

c—Other Conditions.

Trismus—depending upon scar tissue on the inner aspect of cheek requires free removal of scar tissue and its replacement with healthy epithelium. The results are most satisfactory.

After removal of maxilla.—The immediate insertion of a mould for carrying grafts prevents

deformity of face, prevents post-operative haemorrhage and hastens recovery.

After tonsillectomy—grafting of raw surface shortens convalescence, diminishes post-operative haemorrhage and prevents cicatricial contraction. The pillars are sewn together loosely over a graft covered mould.

After excision of tongue. It is suggested by the authors that epitheliazation of the raw surface would permit of much improvement in articulation.

Technique:

1. Preliminary dental work consists in the fitting of suitable apparatus for retaining the graft covered mould in position and differs according to the nature of the case. The article describes and illustrates apparatus to meet different conditions.

2. Preparation of new sulcus. Scar tissue is excised, not merely sectioned, and the periosteum is exposed. Otherwise a spongy mass of tissue is left on the maxilla which interfered with the fitting of the denture. Haemorrhage is arrested by sponge pressure—ligatures not used.

3. Making the mould.

An impression of the new sulcus is now made in dental compound and is kept in position until it cools and hardens.

4. Cutting the graft. A Thiersch graft is taken from a non-hairy portion of skin—forearm or upper arm—and applied to the mould, raw surface outermost, after the mould has been removed from the mouth and thoroughly dried. The edges of graft overlap slightly, but are not redundant. The graft covered mould is now returned to position in the mouth and the fixation apparatus adjusted.

After treatment. The mould is not disturbed for ten days during which time antiseptic mouth washes are employed. The mould is then removed—sulcus gently irrigated and a new mould applied. Every two days thereafter the mould is removed and sulcus irrigated.

The mould is kept in position until the permanent denture or prosthesis is ready for wear. Otherwise the newly formed sulcus contracts rapidly and becomes partially obliterated. Later on this tendency disappears entirely.

Close co-operation between surgeon and dentist is essential to success.

A. T. Bazin.

The Utilization of the Saphenous Vein in the Radical Operation for Femoral Hernia.
(Die Verwendung der Vena Saphena bei der Radikaloperation der Schenkelhernie.)
Hofmann: *Zentrabl. f. Chir.*, Aug., 1921, No. 32, p. 1158.

The methods of radical femoral hernia operation are numerous. The author suggests that after the hernial sac is resected and buried, the saphenous vein should be exposed, ligated at its upper end and doubly ligated about 1 to 2 inches below the first one. The vein is severed between the lower two ligatures. The segment is then split longitudinally and this flap is turned upwards and sutured to the pectineus and adjoining tissues covering in the femoral ring. This method has given good results.

A. B. Illievitz.

Drainage in Carcinoma of the Biliary Ducts.
(Drainage beim Karzinom der Gallengange).
Hotz: *Zentralbl. f. Chir.*, July, 1921, p. 959.

Verhoogen and Wilms recommend, for defects or cicatricial contractions of the common or hepatic ducts, a submerged rubber drain which acts as an artificial duct. The author finds the same method useful in carcinoma of the hepatic duct and recommends it in cases where a radical operation is not indicated.

The parts are first examined by palpation, followed by probing the duct through the gall-bladder and the carcinomatous stricture of the duct identified. The common bile duct is incised and probed in the direction of the duodenum to find out whether the passage into the bowel is free. The success of the investigations is recognized when upon withdrawal of the probe from the direction of the bowel "white bile" is noticed to flow back.

By means of metallic urinary bougies the stricture is dilated gradually until No. 24 is used. A thin, yet sufficiently firm rubber drain, open at both ends and about 12 c.m. long—is inserted into the duct. The duct is sutured over the submerged drain. The gall-bladder is dealt with as indicated by its condition. A gauze drain is left over the duct which can be removed later through the abdominal wound. The submerged rubber drain acts as a duct for bile into the duodenum.

A. B. Illievitz.

The Value of Caecostomy in the Treatment of Malignant Disease of the Colon. STILES, Sir H.: *Brit. J. Surg.*, July, 1921, p. 1.

THE article is a portion of an address delivered before the annual meeting of the Association of Surgeons of Great Britain and Ireland and the author refers to recent papers by Dowd of New York and Bevan of Chicago to demonstrate that there is as yet no unanimity among surgeons in the operative procedure dealing with malignant disease of the colon.

Regret is expressed that although the disease runs a chronic course with generally sufficient obvious signs to permit of diagnosis or at least to compel suspicion so many cases do not reach the surgeon until the condition has culminated in complete obstruction.

Surgical treatment is considered in (1) Cases with complete obstruction; (2) Cases prior to the development of this complication.

Cases with obstruction demand relief of obstruction in the simplest possible way and with a minimum of risk to the patient. Radical operations or even prolonged explorations are not justifiable.

The history together with absence of tumour in the rectum makes possible the diagnosis of obstruction in the colon and caecostomy is indicated. A small incision is made in the right iliac fossa, a diverticulum of the ceacum delivered and its base sutured to the parietal peritoneum and muscles.

If the relief of obstruction be urgent a *small* Paul's tube is immediately inserted.

Emphasis is laid upon the following points:

(a) Exploration through the wound is inadvisable as the site of obstruction can be determined by x-ray opaque enema after patient has recovered from the effects of obstruction.

(b) The whole caecum should not be delivered as it will at once become ballooned and distended, with rupture of peritoneal or even all of its coats.

(c) The Paul's tube should be small, as caecal contents are fluid and spontaneous healing rapidly ensues after removal of obstruction.

(d) The procedure may be done under local anaesthesia.

(e) Recovery is rapid as stasis of small intestine is relieved, and improvement in general condition usually permits of radical operation in ten days.

(f) The site and size of incision leaves free a large abdominal surface through which incision for radical operation may be undertaken without fear of contamination.

(g) The presence of the caecostomy relieves the suture line of the radical enterectomy from all tension from flatulent gas pressure and renders the convalescence smooth and uneventful.

Class 2.—Cases without obstruction: In simple cases the surgeon may decide to complete the operation in one stage by resection and anastomosis.

The only serious frequent complication is gaseous distention of the anastomotic suture line with leakage or slight necrosis giving rise to abscess or faecal fistula appearing about ten days after operation. To avoid this, surgeons have resorted to lateral anastomosis or a two stage operation such as Paul's or Mikulicz'.

Mr. Stiles for ten years has abandoned the two stage operations and after resection and end to end anastomosis he performs a caecostomy as described above, opening the bowel in twenty-four to forty-eight hours.

Convalescence is painless and uneventful; there need be no anxiety about getting the bowels to move as this usually takes place spontaneously about the end of the first week; the caecostomy wound closes without interference in about three weeks.

The writer advises caecostomy either preliminary or as part of the operation in cases of megalocolon, volvulus of sigmoid and certain cases of diverticulitis. A. T. BAZIN.

Intussusception. PERRIN, W. S., and LINDSAY, E. C.:*Brit. J. Surg.*, July, 1921, Vol. IX., p. 46.

A PAPER based on the study of 400 cases of acute intussusception admitted to the London Hospital from 1903 to 1920.

It shows that 78.5% of the cases occurred during the first two years of life and 69.75% during the first year. The curve of incidence rises rapidly from one to five months and the majority of the cases fall within the period of from five to nine months.

A little over seventy per cent. of the cases are classified as ileocaecal or ileocolic, in other words seventy per cent. in the apex of the intussusception was formed either by the ileocaecal valve or the lower ileum usually within six inches of the valve. The authors affirm that any explanation of the cause must satisfy these two observed facts. They find such an explanation in the

condition of the last few inches of the small bowel and ileocaecal valve during the period of life referred to in the paragraph above. During this time particularly from the fifth to the ninth month the ilecocaecal valve is annular in shape and is covered with masses of lymphoid tissue. Also the terminal inch of the mucosa of the ileum is similarly studded with lymphoid tissue which forms a ring round the lumen of the gut. They conceive that this lymphoid tissue by becoming swollen and encroaching on the lumen of the gut could come in contact with the segment of the gut immediately below and be treated as a foreign body. This explanation is thought to be consistent with the great majority of the cases studied.

The symptoms were extraordinarily uniform. Plump healthy children are attacked with spasms of violent abdominal pain. The legs are drawn up. There may be one or even two stools from emptying of the colon which is followed by slime and blood. In 63% only was a lump felt in the abdomen. In 26% of the ileocaecal cases the intussusception presented just inside or outside the anus, in some cases within 10 to 12 hours after the onset of symptoms.

The only treatment considered is operative at a stage of the affection which will permit of reduction of the intussusception. These gave a mortality of 22%. Of 91 cases in which this was not or could not be done only 8 recovered. As in so many other conditions the rate of mortality depends on the time relative to the onset at which the diagnosis is made.

F. A. C. Srimger.

The Kondoléon Operation for Elephantiasis. Henry, A. K.
Brit. J. Surg., July, 1921, Vol. IX., p. 111.

In elephantiasis there are two chief elements, lymph stasis and overgrowth of cutaneous and sub-cutaneous tissues. The lymph stasis may be due to disease or removal of lymph glands, to disease of lymph channels, or to disease of blood vessels. Overgrowth follows upon this soakage of the tissues. The sub-cutaneous fibrous network thickens and holds in its meshes enormous quantities of fat and stagnant lymph, the skin becomes coarse like that of an elephant and the disease thus twice justifies its name.

Prior to 1911 the disease was neither properly understood nor successfully combated. In that year Lanz of Amsterdam recognized that the deep fascia was a barrier to lymph absorption; that the superficial and the deep lymph systems had few anastomoses except at their common glandular terminations; and upon this assumption he incised the deep fascia on the outer surface of thigh and introduced pedicled strips of this tissue between the muscular planes and even through trephine openings into the medulla of the femur. There was immediate diminution in the size of limb and three years later the improvement was still maintained.

Kondoléon failed with a similar technique but elaborated the method by using wide openings through the deep fascia and was successful in eight cases. Other operators have brought the total of reported successes to seventeen.

Because of the development of alveolar spaces in the sub-cutaneous tissue, drainage by small openings in the deep fascia is doomed to failure, as also is the silk strand method of Handley.

Only the pools which are tapped will be drained "leaving a vast lacunar swamp undrained."

In lymph oedema of short duration, as in the upper limb following cancer of breast, the subcutaneous tissue is not loculated by fibrous tissue overgrowth hence the success following Handley's operation.

The author then reports the following case:—French woman, age 34, 3 children, negative family history, vague account of some inflammatory trouble of right leg at age of 7.

Increase in size had been progressive for 27 years, and for a year or two had been associated with attacks of shivering, fever, and pain, redness and swelling of limb. The limb was of great size and from the upper portion of the adductor surface there hung a huge pouch extending almost to the knee and which impeded walking. The foot was unaffected.

A week's rest in bed resulted in no diminution.

At the first operation the large mass in upper adductor region was excised together with a hand's breadth of deep fascia subtending its base; also a large mass the whole length of outer surface of thigh and its subjacent deep fascia. Closed without drainage by skin sutures (mattress and coaptation) of silk worm gut.

Second operation, one month later, similarly removed a wedge on inner aspect of thigh to knee.

Third operation, six months later, removed an elliptical wedge from the whole length of thigh

over hamstrings and also from whole length of calf.

Photographs are presented depicting the condition prior to operation and again eleven months later and four months after the last.

The limb is much smaller and the condition is not recurring in the areas operated upon where it was previously rapidly progressing.

The areas between incisions remain elephantine demonstrating that the drainage is local in its effects.

The author, whilst appreciating the merits of the operation, does not agree with the theory upon which it is based, i.e., drainage of the superficial lymphatic system into the channels of the deep lymphatic system. He presents an argument showing this to be fallacious and advances his own theory, supported by physiological and pathological authority, that the excess lymph is carried off by the venous circulation, aided by the dynamic conditions of varying pressures associated with alternate contraction and elongation of muscles.

A. T. BAZIN.

The Palliative Treatment of Aneurysm by "Wiring" with Colt's Apparatus. POWER, Sir D'ARCY: *Brit. J. Surg.*, July, 1921, Vol. IX., p. 27.

THE author describes the technique for wiring aneurysms by the Colt wisps of wire. These are of different sizes with varying lengths of wire and they increase from No. 1 with a total surface area of 1¾ square inches and 75 inches in length of wire, to No. 3 with 3½ square inches of surface and 150 inches of length. The wire is dull gilt and slightly granular to favor clot formation. The extremities of the wire bundles are soldered at one end and when introduced will flare out like umbrella ribs in shape because of tensile curving.

The operation of insertion is easy under local or general anaesthesia. A small skin incision exposes the most pulsatile portion of the sac and a trocar and cannula is pushed into the cavity of the sac. The former is withdrawn with a spurt of blood if through the clot, if any, in the aneurysm. The wire bundle is then introduced into the cannula and pushed on into the sac, the soldered end entering last.

There is no after bleeding and very few symptoms and the relief from pain is usually prompt.

Sixteen cases are recorded and the results are very encouraging. Several died early after operation and one ten years later, while several cases are alive and well from two to eleven and a half years after operation. C. K. P. HENRY.

Methods to Secure End-to-End Suture of Peripheral Nerves. NAFFZIGER, H. C. *Surg. Gynec. and Obst.*, March, 1921, Vol. 32, p. 193.

DUE to improvement in operative technique, end-to-end suture of peripheral nerves is becoming much more often possible, so eliminating the need for nerve grafts. So anxious are some surgeons to attain this object, that they resort to resection of the bones of the extremities in order to secure the required shortening. The author considers that the cases justifying this measure must be rare.

The methods found the most useful by the author, to obtain apposition of the divided nerve ends are as follows.

1st. Free mobilization of the proximal and distal portions of the nerve. The incisions must be of sufficient length to free the muscular twigs above and below the scar. Greater mobility is obtained and the scar is approached from the two sound and normal portions of the nerve. For operations on the sciatic in the thigh an incision is used which extends from the buttock to the knee.

2nd. Transposition of the nerve to a shorter route than the normal one. The ulnar nerve at the elbow is transplanted from behind the condyle to the flexor surface beneath the superficial muscles.

The musculo spiral may be transposed from the groove on the back of the humerus to the anterior surface.

3rd. Favorable posture of the extremity to shorten the distance to be overcome.

The main trunks lie for the most part on the flexor surfaces or may be transposed to that situation. Flexion of the joint will considerably reduce the gap between the divided ends of the nerves.

4th. Gradual lengthening of the nerve by a two-stage operation.

The fibrous ends are sutured together at the preliminary operation and gradual extension continued for two months when the nerve is resected and an end-to-end suture performed. The most desirable bed for the suture line is against un-

injured muscle. Rotation of the nerve end must be avoided.

The author uses four fine silk sutures through the nerve sheath to bring the nerve ends in apposition. The nerve bundles should barely come in contact.

Posture of the limb after suture is usually maintained for 5 to 6 weeks. The writer has been successful in securing regeneration of a nerve in which a gap of 10 centimeters existed.

GEO. A. FLEET.

Observations on Fifty Cases of Hour-Glass Stomach Subjected to Operation. THOMAS, W. THELWALL: *Brit. J. Surg.*, July, 1921, p. 37.

AFTER studying the notes of fifty consecutive cases surgically dealt with, the following observations are made:

1. Sex incidence. Great preponderance in females, 46 cases to 4 in males.

2. Symptoms. In all cases a long history (average nine years) of gastric symptoms, pain, 8 cases; pain and vomiting, 28 cases; pain and vomiting plus haematemesis, 14 cases, only three of which had severe bleeding.

3. In no patient had malignant disease supervened. Although suspected in 2 cases it was disproved at operation.

4. Definite diagnosis had not been possible in a single case by ordinary methods; radiography was essential.

5. Four cases had previously been operated upon for perforated gastric ulcer; one had had a gastroplasty; one a posterior gastro-enterostomy and one a cholecystostomy (no stone found).

The author deduces that rarely does the acute haemorrhagic type of ulcer lead to hour glass deformity—rather it is the chronic ulcer on lesser curvature with many years continuous or intermittent history.

Many of the ulcers were entirely healed, while again many were unhealed. In all the hard scar tissue contracting had produced the bilocular deformity. In many cases were present extensive adhesions to liver, pancreas, great omentum and even anterior abdominal wall.

This series does not support the view that malignant disease of the stomach is commonly engrafted upon a chronic ulcer.

The author emphasizes that radiographic examination is essential to accurate diagnosis not only of the primary condition but of associated lesions (7 cases had pyloric stenosis). Fluoroscopic readings will differentiate spasmodic from cicatricial hour-glsas. A report on the relative size of the two sacs and upon the muscular activity of the stomach wall are of great assistance in guiding the operator in choice of procedure.

He points out one fallacy, i.e., that the weight of the barium meal with patient erect displaces the pyloric sac and elongates the area of constriction so that it appears to be much lower than is actually found at operation with the stomach empty and patient recumbent. Lack of appreciation of this point has led to the performance of gastro-enterostomy of the wrong pouch.

Surgical intervention is the only possible means of cure and only after thorough exploration of stomach, front and back from cardia to pylorous, can the proper variety of procedure be adopted.

Then follows a description of the various operations performed in the fifty cases.

In 7 gastroplasty was done, in one of which with pyloric stenosis a posterior gastro-enterostomy to distal pouch was added.

In 15 cases gastro-gastrostomy was efficient.

In 14 cases posterior gastro-enterostomy to proximal pouch, in 2 of which the stoma was placed opposite the ulcer and extended into both sacs.

In 2 cases double posterior gastro-enterostomy —one to each sac was demanded where the sacs were small and constricted area extensive.

In 6 patients with extensive adhesions in lesser sac a retrocolic anterior gastro-enterostomy was possible. In 3 of these an entero-enterostomy of the loop was added.

In one case with extensive adhesions to anterior abdominal wall the duodenum was mobilized and anastomosed to the proximal pouch above the area of adhesion.

In one case with many adhesions and also pyloric stenosis it was possible to do a retrocolic anterior gastro-enterostomy to the proximal pouch and a posterior gastro-enterostomy to the distal pouch these surfaces on the respective sacs being free from adhesions.

Two cases necessitated partial gastrectomy, in both a retrocolic anastomosis (Polya) was made.

Operative mortality. Seven deaths occurred in the series; three of broncho-pneumonia; one

of pulmonary embolism on fourteenth day; one suddenly on the day following operation; and two from exhaustion.

Many of the cases were emaciated from the long continued semi-starvation.

End results. All but three were traced. Six have complained of some stomach symptoms: One operated upon 5 years back has "some vomiting." One with 3 years history has "vomiting." Two have "some indigestion." One had a severe haematemesis one year after operation but has been well for subsequent four years. Four have died of intercurrent disease. All others (30) report complete relief. "It does not appear that any particular type of operation had much to do with the final result provided a free flow from the stomach had been established."

The article is short but full of "strong meat," it is freely illustrated with clear diagrams illustrating the condition present and the procedure adopted. A. T. BAZIN.

Fractures of the Carpal Scaphoid. TODD, ALLAN H.: *Brit. J. Surg.*, July, 1921, Vol. IX., p. 7.

FRACTURES of the carpal scaphoid are often overlooked, and failure to diagnose the condition early is fraught with most serious consequences to the patient, leaving him with a disabled painful wrist.

The history is one of definite, severe injury. The acute case presents a characteristic picture: Swelling appearing almost at once in the region of the "anatomical snuff-box" and limited to the dorsum of the radial half of the wrist-joint; severe pain made worse by every sort of movement; limitation of movement, especially of dorsi-flexion; and acute, even unbearable tenderness just distal to the radial styloid in the "snuff-box." In the late case one finds tenderness, and pain in extension of the wrist.

A diagnosis of sprained wrist should not be made without excluding fracture by x-ray. Details of x-ray technique are given.

The various types of fracture are discussed with the mechanism of their production, illustrated by convincing photographs.

All methods of late treatment including removal of the scaphoid are uncertain, hence the emphasis upon early diagnosis and treatment. Preliminary splinting for three weeks is essential to restore a useful degree of function. A long "cock-up" splint is the author's choice. Massage on the splint may be undertaken after the first week and after three weeks mobilization and the employment of the usual physiotherapeutic measures. F. J. TEES.

Treatment of Ectopia Vesicae. ROBERTS, CHAS.: *Lancet*, May 28th, 1921, p. 1125.

THE author employs the following method in transplanting the ureters into the rectum.

Preliminary treatment of patient with hexamine and acid sodium phosphate for several days before operation to render the parts as sterile as possible. No mention is made of any special form of anaesthesia.

Iodine sterilization of the field. A No. 2 catheter (Fr.) is introduced two to three inches into ureters and fixed by fine sutures to bladder mucous membrane ½ inch from ampulla. Circular incision made about catheter and the catheters with ureters and bladder collar 1 inch in diameter are drawn down.

A transverse incision is made through posterior wall of bladder, an assistant placing fore finger of right hand in rectum and pushing the latter forward—while the sero-muscular layer of the rectum is grasped and sutured to the bladder wound making the operation extraperitoneal. The rectum is then incised transversely and the catheters pushed through the incision into rectum. The edges of the wound in rectum are sutured fixing the catheters one at either angle of the incision. The transverse incision in bladder is sutured.

In the female the incision is made above the uterus.

Subsequent treatment. Patient is given hexamine and acid sodium phosphate as before. Catheters removed 5th to 7th day by drawing down through anus. A secondary operation six months later, when mucous membrane of bladder is excised and layers of skin sutured with running buried suture.

Results. Patient frequently develops transient seizures of pyrexia and malaise.

Patients urinate 4 to 5 times daily; bowels are regular once daily independently of urination.

The author cites four cases, the operation being satisfactory in all four. One patient coming to puberty, menstruation was normal and regular.

A. D. CAMPBELL.

SURGERY OF THE EXTREMITIES

Treatment of Long Standing Dislocations of the Hip. SCHOEMAKER, J. *Surg.Gynec. and Obst.*, May, 1921, p. 461.

Two cases are reported of the reduction of dorsal hip dislocations of long standing.

One was of 13 years' duration in a young woman of 23 following typhoid, the other of 3 months' duration in a man of 61, of traumatic origin. In both cases the bones showed approximately normal outlines, and by using an imitation of the Lorenz method of reducing congenital hip dislocations reduction was successful. The head must be brought to the entrance of the acetabulum with the limb placed in complete abduction after complete flexion.

Deep narcosis is necessary. Retention is by plaster of Paris spica. Both patients walked without a limp after recovery.

J. A. NUTTER.

Operation for the Removal of Complete Cervical Rib. POOL, EUGENE H. *Surg. Clin. North America*, April, 1921, p. 325.

DR. POOL presents two case reports of cervical rib, both in young women with complaints of pain and tingling or numbness in the hand. One patient in addition complained of weakness and transitory swelling of her arm. X-rays showed cervical ribs. The incision employed by Dr. Pool follows the clavicle, ½ inch above it. The cervical rib is exposed and freed in its anterior portion between the brachial plexus, which is retracted backwards, and the subclavian artery which is pulled forwards. The posterior portion is then reached by way of a vertical incision through the trapezius and levator anguli scapulae, and it is then cut off with rib forceps where it lies next the transverse process of the vertebra, the head of the rib being left. It is to be noted that incomplete cervical ribs may be attached by ligamentous prolongations to the first rib. Such prolongations should be removed, as they are often the cause of the symptoms. J. A. NUTTER.

Sling Suspension Method of Exercise in Infantile Paralysis. GOLUSLEN, F. J. *Surg. Gynec. and Obst.*, March, 1921, p. 274.

THIS is a method of avoiding the effect of gravity and friction in the exercising of muscles weakened by poliomyelitis. The arm or leg is suspended by a rope and pulley and movements are confined to making the limb sway from side to side. By changing the position of the child various muscle groups can be brought into action.

The author points out that voluntary motion is of vital importance in the treatment of infantile paralysis and considers that by this method muscle training may be begun earlier than has hitherto been possible.

Photographs of an interesting character accompany the article. J. A. NUTTER.

Reconstruction of the Hand. TAYLOR, R. TUNSTALL: *Surg. Gynec. and Obst.*, March, 1921, p. 237.

IN this article Dr. Taylor describes the operative repair of traumatisms and infections of the hand. Preparation for operation is by the time-honored method of potassium permanganate and oxalic acid following usual wash-up. Operation is done under a tourniquet. Special tendon clamps devised by the writer are described and illustrated, also special methods of tendon suture by silk.

Various methods of tendon transfer are discussed and described with illustrative cases. In the after treatment the Skirball and Lewis splints are found useful. These are illustrated. Credit is given to hydrotherapy, especially the whirl-pool bath. J. A. NUTTER.

A Rare Case of Rupture of the Biceps Brachii. (Seltene Bicepsverletzung) (Pseudohernie). GLASS: *Zentralbl. f. Chin.*, March, 1921, No. 11, p. 367.

THE author tells of a case under observation from November 1st, 1920, to January 3rd, 1921. A workman 46 years of age while using a heavy hammer suddenly checked its descent to prevent a fellow workman from being injured—the arm immediately become paralysed. From October 22nd, 1920, till the end of that month he continued work with light duty. On the 1st of November, 1920, he noticed a depression in his arm on extending it. Under local anaesthesia the operation revealed the fascia of the biceps split longitudinally, the muscle torn across about its middle and a good deal of clotted blood in the space between ends. The muscle was reunited with silk, the arm in a flexed position—

the fascia sutured and wound healed by first intention.

Since January 5th, 1921, the patient is again fit for work. A. B. Illievitz.

Hallux Valgus, Rigidus and Malleus. Jansen, Mark: *Am. J. Ortho. Surg.*, March, 1921.

This paper, in which the etiology and pathology of these conditions are described, was read at a meeting of the British Orthopaedic Association June 4th, 1920. It was followed by an interesting discussion on the part of several of the most prominent of the British Orthopaedic surgeons, including Sir Robert Jones. During this discussion the point was made and largely agreed upon, that for hallux valgus and rigidus the excision of the head of the 1st metatarsal was by far the best operation. The use of the wedge operation was condemned owing to the liability to recurrence of the deformity, as also the simple removal of exostosis from the prominent aspect of the joint.

In the case of hallux valgus in young people, associated with rheumatoid, Mr. Trethowan strongly advised against operation of any kind. Where the sesamoid bones are adherent under the great toe joint and are a source of disability their removal is indicated. J. A. Nutter.

ANAESTHESIA

A New General Anaesthetic: Its Theory and Practice. Wallis, R. L. MacKenzie and Hewn, C. Langton. *Lancet*, June 4th, 1921, p. 1173.

Part I.—By R. L. MacKenzie Wallis

It was found that pure ether could be given in large quantities without producing anaesthesia; only intoxication was produced. It was obvious that the anaesthetic properties of good anaesthetic ether were wholly due to one or other of the compounds found in it. Samples of various ethers made from industrial spirit, a mixture of ethyl and methyl alcohols, were examined and found to contain not only the three ethers—dimethyl, diethyl and methyl ethyl ether, but in addition abundant impurities—alcohol, water, acetone, mercaptan and thio-ethers. Impurities formed by oxidation of the ether include aldehydes, peroxides, and acids. Carefully prepared samples of ether naturally contain very small quantities of these impurities, but the purer the sample the more of it is required to produce anaesthesia.

The purified ether was used as a vehicle for the anaesthetic compound. The writers found that, using good samples of anaesthetic ether, before distillation no ethylene or carbon dioxide were absorbed, but after distillation large quantities were absorbed, and the resulting mixture was extremely potent as an anaesthetic.

Ethylene itself, prepared from ethylchloride and sulphuric acid possesses very little anaesthetic power. Ether and carbon dioxide were found to be without action as an anaesthetic.

The authors conclude that ketones were largely responsible for the anaesthetic properties of the ether they prepared. A mixture of ketones proved to be very potent and was dissolved in pure ether. The anaesthetic action was enhanced if the mixed ketones were first treated with carbon dioxide and ethylene.

The process of manufacture was undertaken by Messrs Savoy and Moore who have placed it on the market under the name of "Ethanesal."

Part II.—By C. Langton Hewn

Ethanesal was administered in a large number of cases. Respiration was found to be quieter than with ether. There was less irritation, less cough, and less salivation. It was given to ten cases of well marked bronchitis, none of whom showed any aggravation of their symptoms.

As regards systolic blood pressure this anaesthetic occupies a position half way between chloroform and ether. The pulse pressure does not rise as high as with ether, yet at the end of the operation and afterwards, when the patient is conscious, it is higher than with ether or chloroform.

Ethanesal has been used by the writer in mitral regurgitation, congenital pulmonary stenosis, in one case of advanced mitral stenosis with auricular fibrillation, in marked anaemia from haemorrhage and other causes, in neglected perforated gastric and duodenal ulcers, neglected intussusception, toxemia of pregnancy, in three cases of well established diabetes mellitus and many other conditions without apparent ill effects.

He found it sometimes possible to get analgesia without anaesthesia. Post anaesthetic vomiting was less than after ether or chloroform, and recovery quieter. Taste and smell are practically non existent with ethanesal. The

best method of induction of anaesthesia was found to be with Clovers' inhaler, which was later changed for an open mask. Nitrous oxide as a preliminary was found to be unnecessary. Ethanesal was also used satisfactorily by the intratracheal method. W. B. HOWELL.

RADIOLOGY

Observations on the Behaviour of the Normal Pyloric Sphincter in Man. MCCLURE, C. W., and REYNOLDS, L.: *Am. J. Roentgenol.*, Vol. 8, p. 158, April, 1921.

RESULTS obtained from experimental studies of animals can be applied only in a general way to the physiology of the digestive tract in man. This article is a preliminary report dealing largely with the work bearing on the question of "Acid Control" of the pyloric sphincter in man. Experimenting on animals, Cannon and others concluded that the presence of acid in the antrum of the stomach causes relaxation of the pyloric sphincter, whilst the presence of acid in the duodenum causes the sphincter to contract. It has not been demonstrated whether or not acid or some other factor exerts the principal control over the pyloric sphincter in man. This is the problem with which the present investigation is concerned. The conclusions of the authors drawn from the experimental work in man are as follows:

1. Finely divided carbohydrates, protein or fatty food stuffs begin to leave the normal stomach within from three to ten minutes after their initial ingestion.

2. Under normal conditions the human pyloric sphincter opens regularly at the approach of each antral peristaltic wave, allows the chyme to pass through into the duodenum during an appreciable length of time, and closes when the antral peristaltic wave has spent itself.

3. The introduction of N/40, N/20 or N/10 hydrochloric acid solutions into the first, second or third portions of the normal human duodenum produced either no effect on the opening of the pyloric sphincter—as observed by means of the fluoroscope—or produced effects which were interpreted as the result of abnormal irritation of the duodenal mucosa.

4. Neutralization of the contents of the first portion of the duodenum did not prevent the closing of the pyloric sphincter.

5. Experimental results obtained offer evidence that acid is not the principal factor controlling the opening and closing of the pyloric sphincter in man. W. A. WILKINS.

Subphrenic Pneumo-peritoneum. Produced by Intra-Uterine Insufflation of Oxygen as a Test of Patency of the Fallopian Tubes in Sterility and Allied Gynaecological Conditions. RUBIN, I. M. *Am. J. Roentgenol.*, March, 1921, p. 8.

WASHED oxygen is introduced through a cannula into the uterus, the flow of gas being carefully regulated as to pressure and volume. In cases where Fallopian tubes are patent, a small sub-phrenic pneumo-peritoneum appears almost immediately which is readily demonstrated by fluoroscopy; where tubes are occluded the mercury manometer shows a rapidly increasing pressure, and pneumo-peritoneum fails to appear. The writer's apparatus is simple: his series of 150 cases show no ill results and patients have not complained of distress. In cases of patent tubes, 150 cc. of gas with a manometer reading of not more than 60 mm. of mercury is sufficient; with occluded tubes it is not safe to allow pressure to exceed 200 mm. of mercury.

The method, from a diagnostic standpoint, has obvious advantages as compared with tubal injection using opaque solutions or with abdominal section, and specifically establishes the question of patency or non-patency of the Fallopian tubes. A. S. KIRKLAND.

MEDICINE

Gonorrheal Endocarditis; Review and Report of a Case. SMITH, DUDLEY C., M.D. *Am. J. M. Sc.*, June, Vol. 161, 1921.

In reviewing previous cases reported and the experience of other observers, he draws the following conclusions:

(a) For the production of a gonorrheal endocarditis a septicaemia is necessary.

(b) That in one third of the cases reported it has been the right side of the heart affected.

(c) That the onset of an endocarditis may occur a few days after infection or be delayed until after repeated attacks of urethritis.

(d) That the process may be of a benign type resolving with little subsequent damage, or it may proceed to a malignant type.

An example of the latter he cites in detail:

A man aged 28 years contracted an acute urethritis in August, six weeks later developed chills, and after a course characterized mainly by loss of cardiac compensation with chills, fever and periods of stupor, died in December.

The anatomical diagnosis showed a gonococcal endocarditis and septicaemia; ulcerative and vegetative pulmonic endocarditis; ulcerative aortic endocarditis; mural endocarditis and a healed pericarditis. Smears from thrombi and heart's blood showed the specific Gram-negative organism, but cultures were negative.

C. F. MOFFATT.

Acute Arteritis Complicating Pneumonia. HEAD, GEORGE DOUGLAS: *Am. J. M. Sc.*, Vol. 162, August, 1921:

AN examination of the literature reveals that an acute inflammation of the arterial walls during the course of such infections as typhoid septicaemia, etc., is not uncommon but is a rare complication of acute pneumonia.

Three previous cases are abstracted from the literature to which are added two further cases. Both examples occurred in soldiers at a concentration camp during the convalescence from acute pneumonia.

The most prominent symptoms were sudden onset of sharp pain and tenderness radiating down the artery involved, followed by swelling and discoloration of the distal parts associated with a rise in temperature.

In both cases the process involved the arteries of the leg; from both was isolated a type IV. pneumococcus.

In the first case the arteritis produced dry gangrene of the foot entailing amputation.

In case 2 the process did not proceed beyond numbness and discolouration of the toes with small areas of ulceration and necrosis. In neither was there any reason to suspect embolism. C. F. MOFFATT.

Studies on the Dosage of Digitalis in Children. MCCULLOCH, HUGH and RUPE, WAYNE A.: *Am. J. M. Sc.*, Vol. 162, August, 1921.

THE purpose of the authors was to establish a relationship between the dosage of digitalis and the body weight such as has been worked out in the case of adults. The patients used were children up and about the wards to the number of thirty-six, with no recognizable heart disease. The dosage was the same as in adults, allowance being made for weight and age, the estimated total dosage being divided over a period of six days. The drug used was a standardized tincture and its effect checked by the electrocardiogram.

Considerable variation was found in the amount of digitalis necessary to bring about response.

(a) Up to the age and weight of four years children responded more readily than children over that age.

(b) In only three patients were digitalis effects seen after doses sufficient to produce optimum effects in adults.

(c) No effect noted in eight patients after dosage two to three times as great as would be required in adults.

(d) Digitalis affects in thirteen children obtained only after dosage two to three times as great as would be required in adults.

(e) In ten patients it required five times the adult dosage before effects seen.

(f) The administration of quite large doses was never attended by other than very minor evidence of digitalis action. C. F. MOFFATT

A Treatment of Gastric Ulcer based upon Modern Clinical, Histopathological and Physiological Investigations. SMITHIES, FRANK: *Inter. J. Gastro-Enterology*, July, 1921, Vol. 1, p. 13.

IT is doubtful if peptic ulcer is to be considered as a clinical entity. Preferably should it be regarded as the local manifestation of a system condition, as it occurs but rarely apart from other clinical abnormalities, such as focal infections, circulatory disturbances, etc. In a series of 522 cases, the infections, arteriosclerosis and "visceral hypertonia" accounted for 60% —and syphilis and chronic anaemia for another 20%.

Fully two-thirds of all gastric ulcers are found in that part of the viscus where occurs the greatest mechanical activity; not in the fundus where HCl is secreted. It further appears that in formulating a method of treatment, it is more important to consider the mechanical factors concerned with digestion, than variations in the secretary function.

Certain important physiological facts are emphasized by Smithies; notably that the

fasting stomach is in a state of tonic contraction, and is rarely empty; HC and pepsin are present and may aid in maintaining tone. Hunger is manifested by rhythmic gastric systoles. Repeated swallowing causes inhibition of gastric tonus. The entrance of food into the stomach initiates peristaltic movements which pass regularly towards the pylorus and maintain a constant pressure in the antrum; the fundus acting chiefly as a reservoir. The relaxation of the pylorus is intermittent and depends upon the presence of unneutralized acid. When this acid chyme enters the duodenum, the pylorus remains closed until it becomes neutralized, when it again relaxes and permits the ejection of more chyme, until the stomach is empty.

Very important in the author's opinion, is a proper understanding of how the main foods act in the stomach: Carbohydrate foods leave the stomach quickly, as they have no combining power, and hence allow a large amount of free HC to come into contact with the sphincter to cause rapid opening. If, however, the carbohydrate be mixed with alkaline solutions, this facility of discharge is interfered with. By the same token, protein leaves the stomach slowly as it combines with the free HC—and so retards the development of free acid which initiates the pyloric opening. Furthermore, protein food stimulates the flow of much more gastric juice than does carbohydrate. So that when this protein reaches the duodenum, there is more acid to neutralize and the pylorus remains closed for a longer period—against a strong peristaltic activity within the stomach itself. Fats remain longest in the stomach, as they excite little free HC production; and the acid control of the pylorus is reduced to a minimum. Vigorous churning of food with chyme occurs in the antrum and pylorus—the area in which occur 60% of all gastric ulcers. So that food delay in this locality accentuates any pathology already present.

The foregoing facts—Smithies believes furnish a logical ground—work for the treatment of peptic ulcer. The importance of care in selecting cases for medical treatment is dealt with operation being particularly indicated in ulcers showing much scarring or gastric deformity; or in calloused ulcers. The essentials of medical treatment are (1) Rest in bed for from one to three weeks. (2) Rest for the stomach itself—which includes avoidance of irritating medicine, gastric lavage and undue palpation. (3) Cold compresses. (4) Abstinence from food by mouth for from 3 to 7 days, during which paraffin wax is to be chewed for 10 minutes every hour, and rectal feedings are employed of alcohol and glucose saline. (5) Mouth feeding is begun from the fourth to the seventh day. The nourishment should be liquid, and given warm in small quantities. Carbohydrates should be used, 4 to 6 ounces of barley water, rice gruel, thin cream of wheat, or thin creamed vegetable soups are given every hour. Milk is not advised.

If the above points are carried out, the exhibition of large quantities of alkali or other medicines will prove to be unnecessary.

A. T. HENDERSON.

PEDIATRICS

Roentgen Ray and Tuberculosis in Infants and Children. O'BRIEN, F. W., and AMES, F. B.: *J.A.M.A.*, May 28th, 1921.

A STUDY of 44 cases at the Boston Consumptive's Hospital.

The cases were first divided into age groups, one including children under 2 years, a second, those between 2 and 10 years, and a third containing all above 10 years.

"Final clinical diagnosis in any given case was the result of composite estimate of general constitutional findings, such as weight, fever or cough, or of various standard tests, sputum examinations and physical signs. To this was added the roentgen ray, each case being carefully studied with plates. Fluoroscopy was not much used.

Their conclusions were as follows:—

1. (a) The Von Pirquet and intracutaneous skin reactions are reliable guides to infection with tubercle bacilli and the number of positive reactions increases from infancy up through childhood. Over 10 years of age all patients react.

(b) In 26 of 36 positive skin reactions, the roentgen ray disclosed the site of infection to be intrathoracic.

2. D'Espine's sign as a clinical index of tuberculosis of the bronchial lymph nodes is of relatively little value, being elicited only 11 times as against roentgen ray evidence of glandular enlargement in 28 cases.

3. Three cases of positive sputum were found in 14 diagnosis of chronic pulmonary tuberculosis.

4. 14 cases of chronic pulmonary tuberculosis of the adult type were found. This suggests that the so-called phthisis is more common in children than has been stated by writers of text-books.

5. Fifteen cases, negative clinically, showed definite roentgenray signs of marked structural changes consistent with tuberculous infection.

J. D. MASON.

Demonstration of Food Proteins in Human Breast Milk by Anaphylactic Experiments on Guinea Pigs. SHANNON, W. RAY, *Am. J. Dis. Child.*, Sept., 1921.

SHANNON was able to produce anaphylactic shock in guinea-pigs by sensitizing them to egg albumen and then injecting small quantities of breast milk from a nursing mother who had been fed two eggs for breakfast for three successive days.

He concludes from this study that egg protein may be present in the milk of some nursing mothers and that under these conditions it may be the cause of disturbances in the nursing infant. He suggests that it is probable that this may occur with almost any other food that the mother may eat and contends that in view of these findings we must revise our ideas concerning the diet of nursing mothers and that we must study our cases of food disturbance in the nursing infant from the standpoint of what the mother is eating. A. GOLDBLOOM.

Book Reviews

OPERATIVE SURGERY. For Students and Practitioners. By JOHN J. MCGRATH, M.D., F.A.C.S., Professor of Surgery, Fordham University. Sixth Revised Edition. With 369 illustrations, including full page color and half tone. Philadelphia, F. A. Davis Company, Publishers, 1921. Price $8.00 net.

In this work the author describes the various surgical procedures which are usually carried out in the different regions of the body, and also includes a full reference to the surgical anatomy of the parts involved. The text is compact and clear, and the illustrations, many of them copied from the original, are good. The fact that a sixth edition has been required would indicate that the author has met with considerable success in his effort to describe the operations of surgery.

While in a general way the volume is a safe guide to the study of this subject, it is to be regretted that in many instances valuable space is wasted in a description of methods which have long since outlived their usefulness, while on the other hand either the briefest or no mention at all is made of technic which is now in every day use in the surgical centres of the country.

For instance several pages and illustrations are used to describe arterio-venous anastamosis of blood vessels for blood transfusion, while a short paragraph is allotted to the sodium citrate method, and no mention at all is made of the paraffin coated Kimpton-Browne tubes; tests for haemolysis and agglutination are dismissed with two lines.

Several pages are devoted to the extirpation of the Gasserian ganglion by the Hartley-Krause, the Cushing, and the Rose-Andrews operations, and simple section of the sensory root is not mentioned.

In describing the operation of Cholecystostomy the author advocates suturing the fundus of the gall-bladder to the parietal peritoneum and transversalis fascia, a method long since discarded by the majority of operators.

The operative treatment of fractures is dealt with by a very short reference to the Lane plate, while no mention is made of the various bone grafting operations either for the treatment of fracture, of various orthopedic conditions, or of tuberculosis of the vertebrae.

Reference to the surgery of the abdomen occupies almost half the volume, and comprises much the best part of the work. Practically all the operative measures in general use are well and fully described, and the author gives full credit to various surgeons for their particular modification of methods. E.R.S.

KEEN'S SURGERY, Volume VIII. By Surgical Experts. Edited by W. W. KEEN, M.D., L.Ld., Hon. F.R.C.S., Eng. and Edin., Emeritus Professor of the Principles of Surgery and Clinical Surgery, Jefferson Medical College, Philadelphia. Octavo of 960 pages with 657 illustrations, 12 of them in colors. Philadelphia and London: W. B. Saunders Company, 1921. Price Vol. VII. and VIII. and Desk Index Volume Cloth, $27.50 net per set. Sold by subscription. Sole Canadian Agents, The J. F. Hartz Co., Ltd., Toronto.

This excellent volume comprises a supplementary review of all subjects of surgical interest not covered in Vol. VII., and to the civilian practitioner is perhaps of even greater interest than that volume since it is less occupied with the surgical lessons of the great war, and more with the problems of every day work.

As each of the forty-one chapters is written by an acknowledged authority, and since the very latest available information is included, the volume may well be considered as the most valuable contribution to surgical literature of the present day. As a work of ready reference its value is much enhanced by the very complete and compact separate index volume which accompanies it.

Faced by such a mine of surgical information space does not permit one to go into details concerning the material in each chapter. Special mention should perhaps be made of the excellent review of The Endocrine System of Glands, of the Surgery of the Thyroid, of the Pathology of Goitre, of the Chemical Nature of the Thyroid Secretion, of the Surgery of the Adrenals, and of the Hypophysis emanating from several of the workers at the Mayo Clinic.

Warbasse contributes an excellent chapter on Operations on Bones and Joints.

The surgery of the Head by Neuhof, and of the Fifth Nerve by Frazier are the last word on these subjects, and it would appear to have been definitely established that sensory root section is much preferable to removal of the Gasserian Ganglion in Trigemonal neuralgia.

Chevalier Jackson's unique experience attaches unusual interest to his article on Direct Bronchoscopy and Esophagoscopy.

The chapter on Appendicitis by Deaver and Pfeiffer is, as would be expected, a masterpiece, and recalls that the original article in Vol. IV. was written by Murphy. One cannot refrain from quoting "It is not surprising then that the contribution from his pen, should on close examination after a decade, be found to contain little which permits of change, or to omit much that is of first importance. Still the wide dissemination of that knowledge is far from complete."

The Surgery of the Bladder and Ureters is admirably handled by Bransford Lewis, as is the Surgery of the Prostate by Hugh H. Young. Dr. Young is still a strong advocate of the perineal operation for prostatectomy.

The Place of Physiotherapy in Surgical Treatment by R. Tait McKenzie, and Diagnostic Immunologic Reactions, and Specific Therapy in Surgical Diseases by Kolmer are both of great interest.

The entire volume is beautifully illustrated, and the distinguished Editor as well as the publishers are to be congratulated on the success of their undertaking.

E.R.S.

MATERIA MEDICA AND PHARMACY FOR MEDICAL STUDENTS. 4th Edition. By R. R. BENNETT, B.Sc., F.I.C. Pages xxiii-264. f'cap 8vo. 7/6. H. K. Lewis & Co., London. 1921.

This pocket book, which in printing and binding is a credit to the publishers, contains in addition to abbreviated descriptions of the drugs and preparations of the British Pharmacopœia with some notes as to their therapeutic employment, short chapters on pharmaceutical definitions, weights and measures, and a useful one on incompatibility. The drug stuffs are grouped into supposedly pharmacological groups, the first of these is known as Delirifacients and includes Belladonna and Atropine, Hyoscyamus, Cannabis Indica and others, none of which are employed for the purpose of creating delirium. Another group is described as Depresso-Motors and contains Physostigmine, Lobelia, Bromides, Nitrites, etc. Such a classification is purely fantastic and no aid to the practitioner or student, either in treatment of patients or in learning the actions of drugs. Surely it is high time that a pharmacy was written for medical students by a physician with a modern training and a knowledge of the use that the physician should be able to make of this subject.—V.E.H.